ELECTRICAL TIMES

THURSDAY,
FEB. 2, 1950

VOL. 117
NO. 3039

EST. 1891

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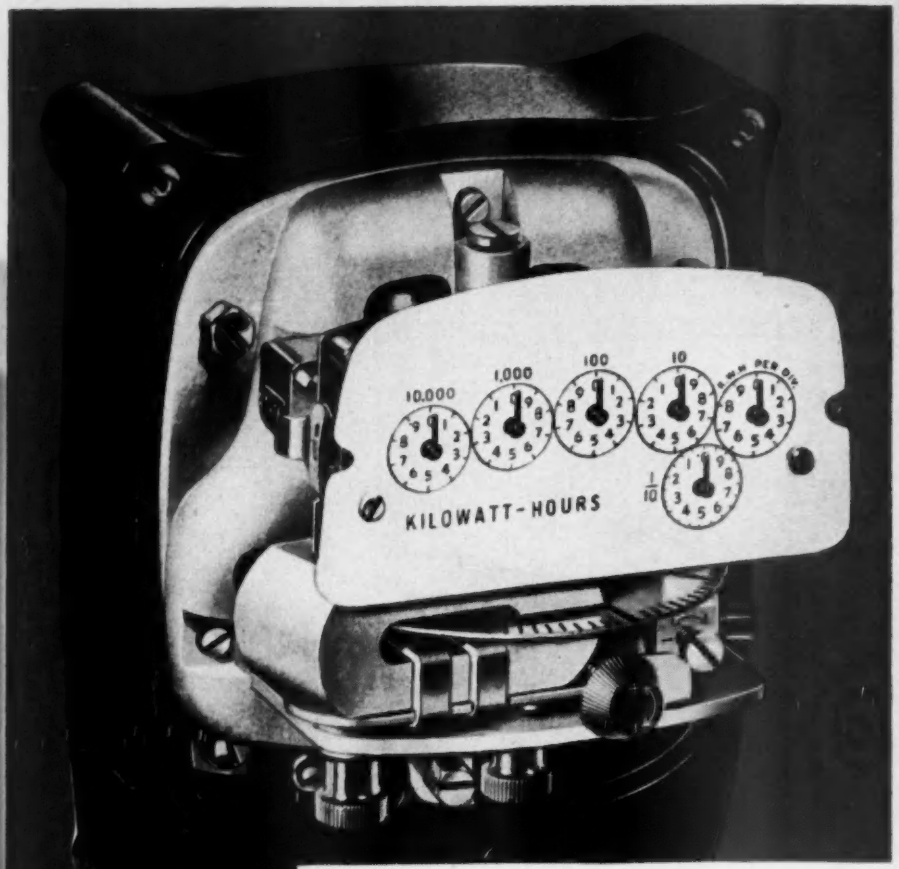

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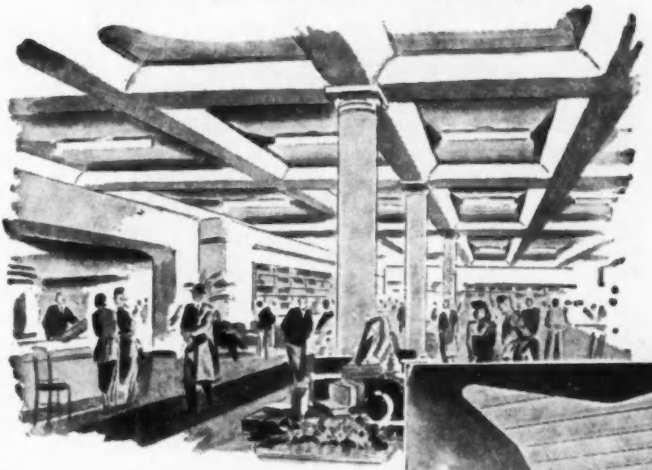

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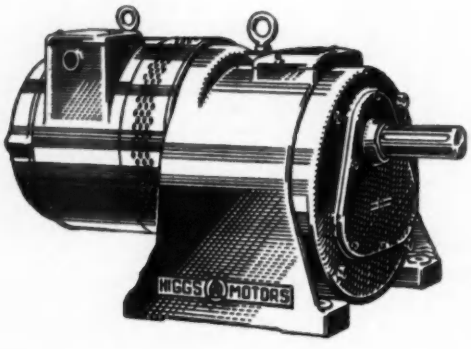

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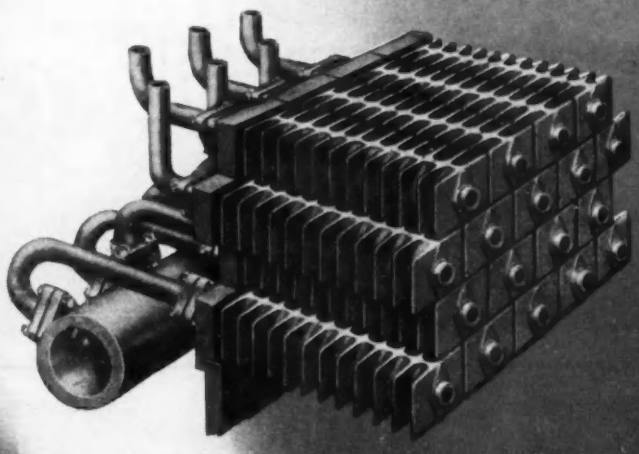

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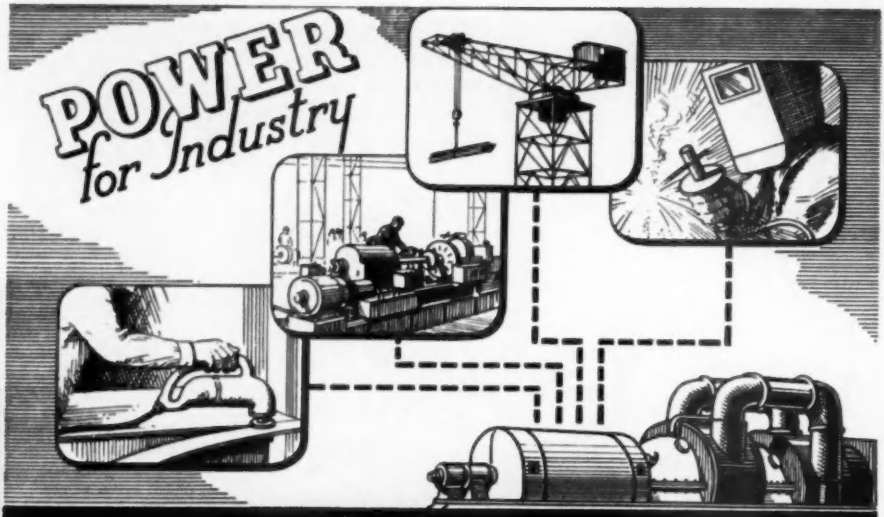

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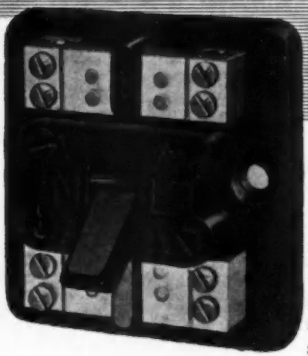

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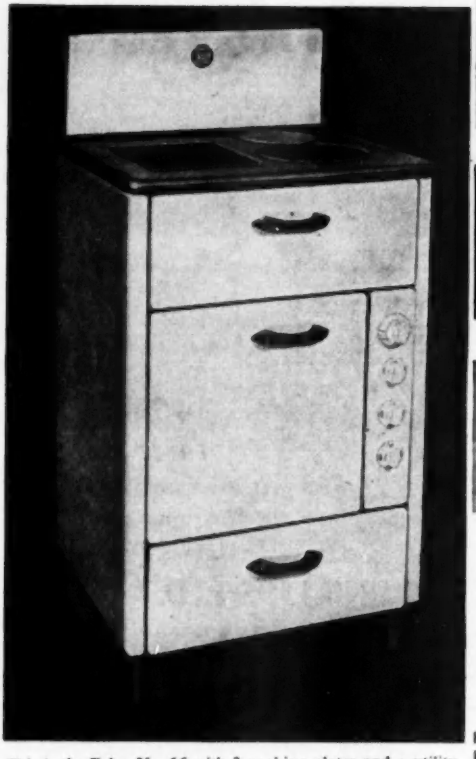
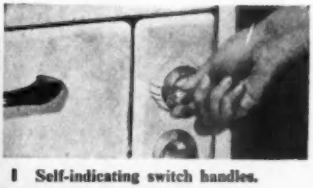


This is the **Falco No. 16** with 3 cooking plates and a utility drawer at the bottom for cooking utensils . . . **Falco No. 15** is the same but has 2 cooking plates . . . **Falco No. 17** is the same but has 2 cooking plates and no utility drawer.



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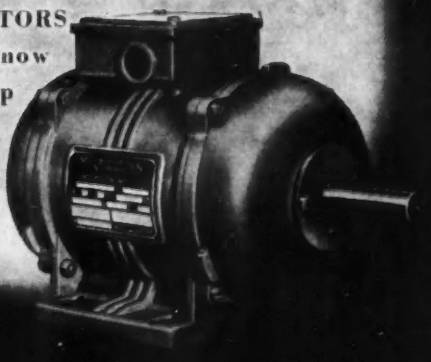

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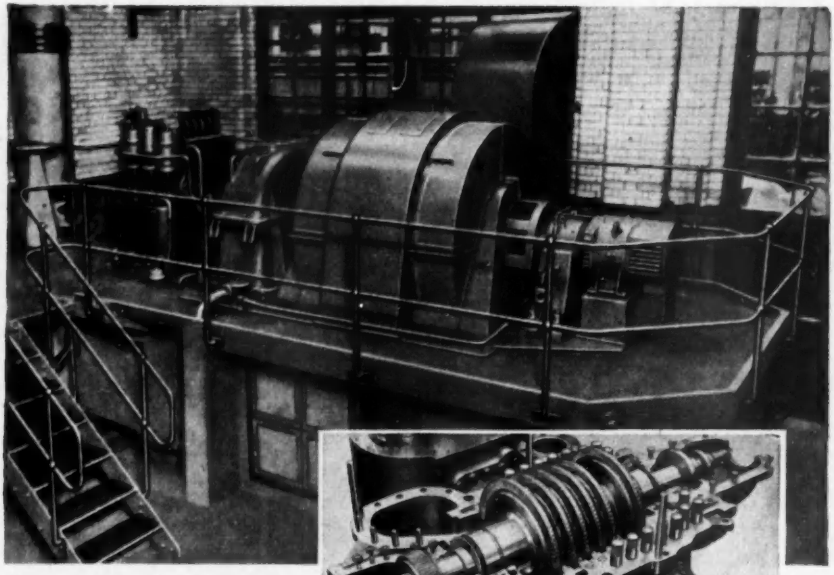

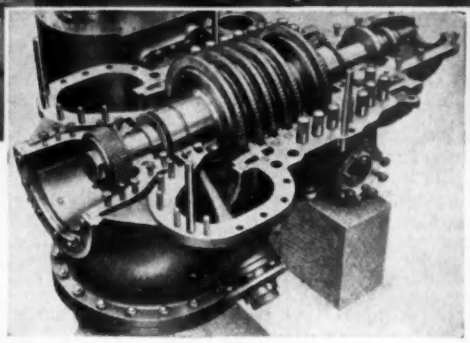

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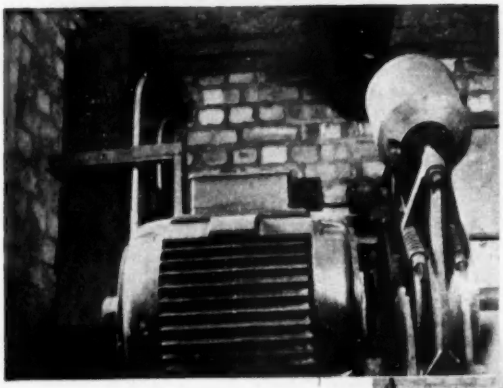
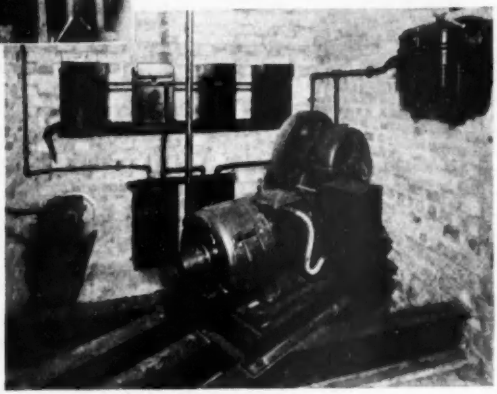


Keighley lift motor at Robert Porter & Co. Ltd.



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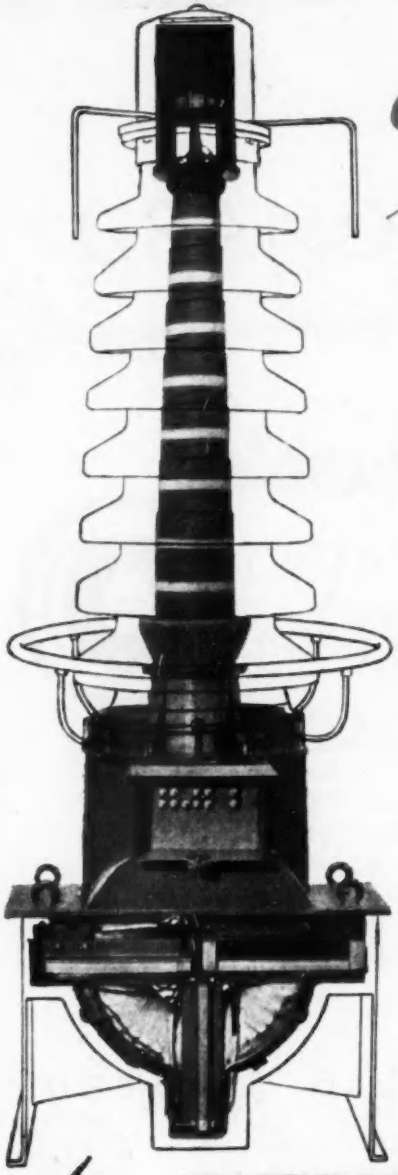

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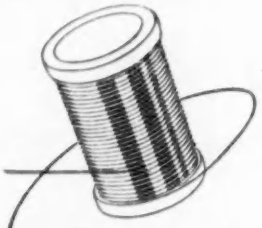

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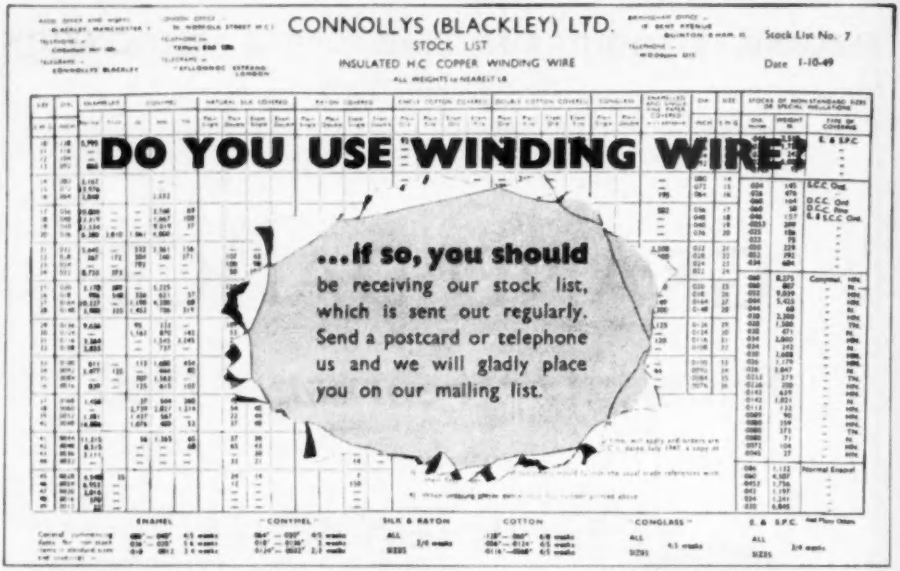
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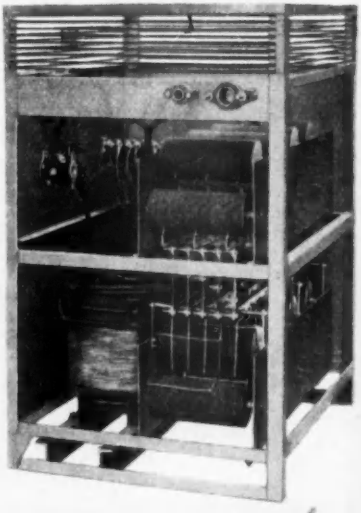

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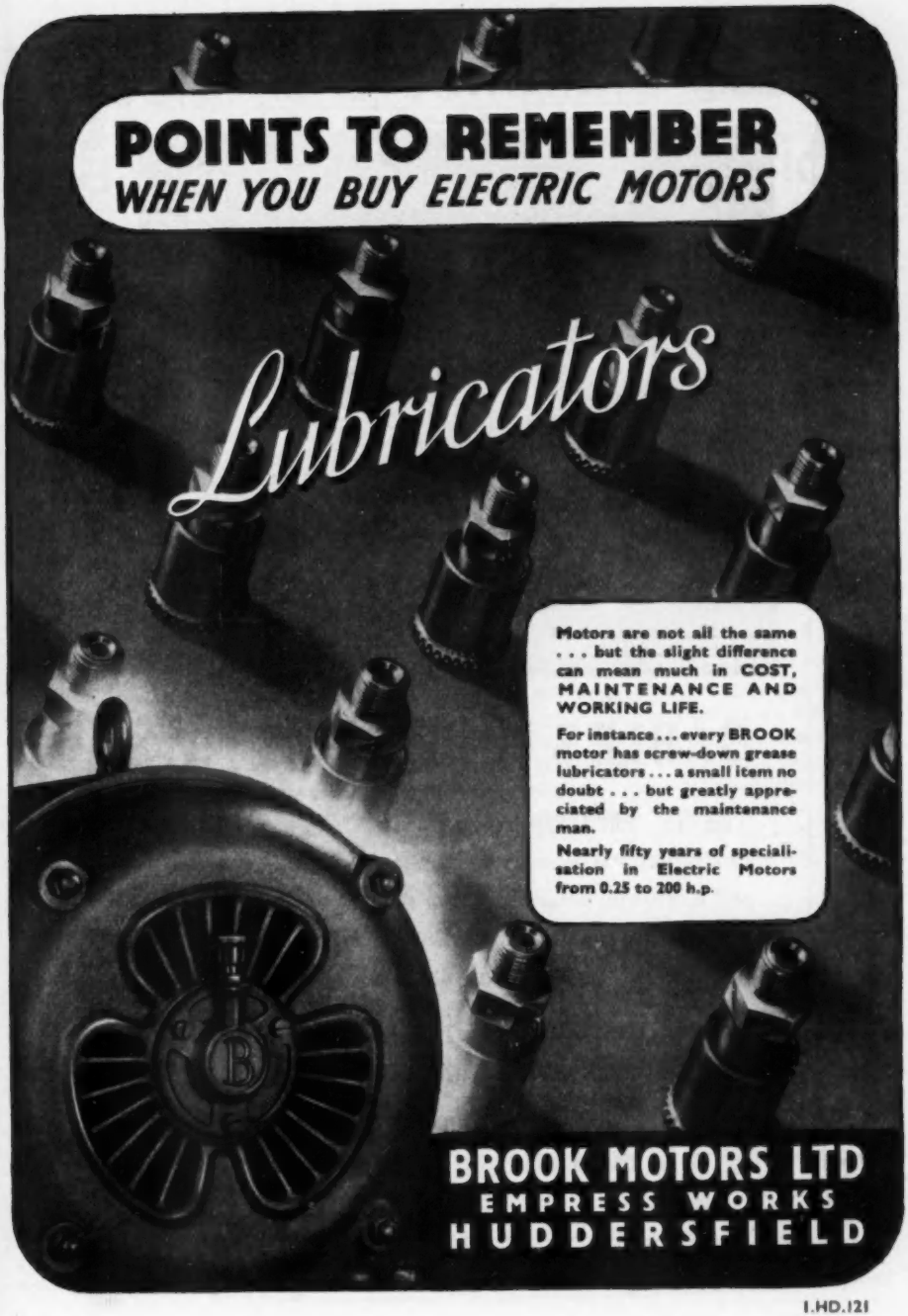
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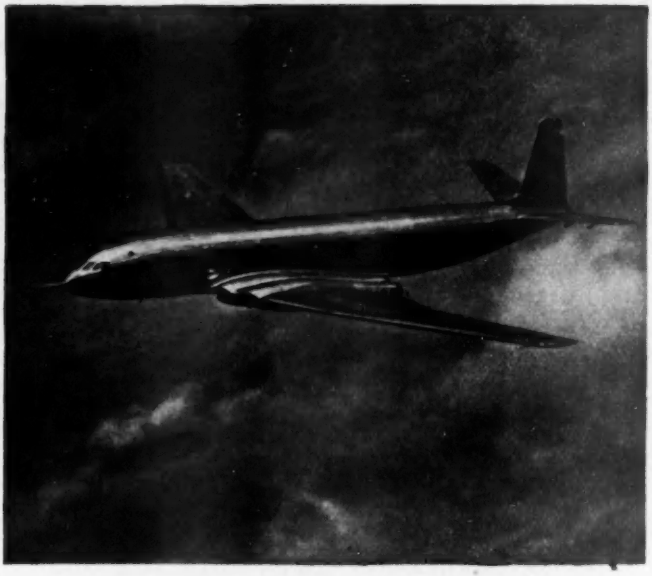

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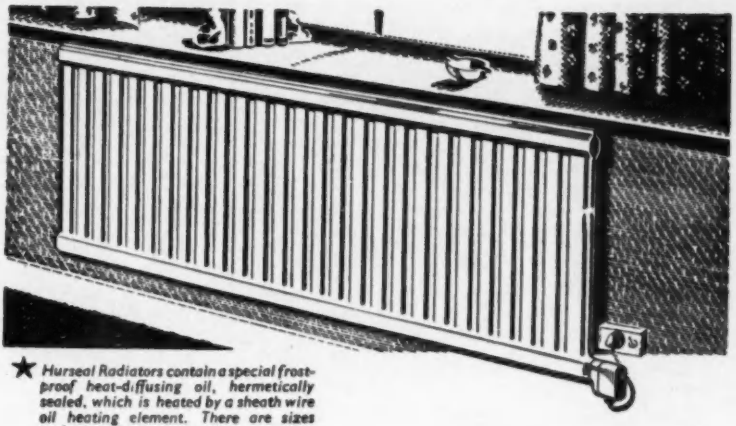

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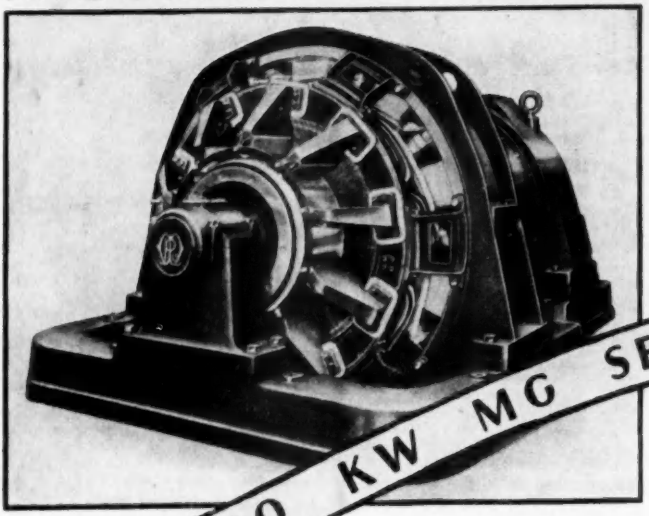

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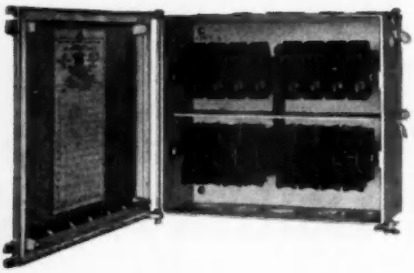

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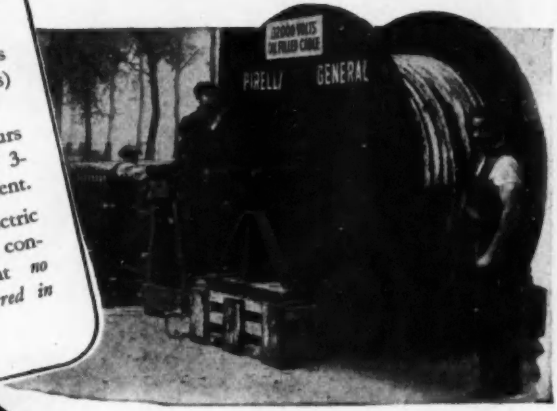

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ELECTRICAL TIMES

Vol. 117 No. 3039 THURSDAY, FEBRUARY 2, 1950

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FIFTY-NINTH YEAR OF PUBLICATION

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by
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An impressive and novel scheme has been devised for the Chamber by the G.E.C. in collaboration with the Architect, Sir Giles Gilbert Scott, O.M., R.A., and the Consulting Engineers, Oscar Faber & Partners, employing OSRAM Fluorescent lamps (hot and cold cathode), specially-designed G.E.C. fittings and unique dimming and control systems.

A further contract for the lighting of the new House of Commons has been entrusted to the G.E.C. which includes all the fittings for Ministers' Rooms, Committee Rooms, Lobbies, Corridors, etc. To ensure the work being completed on time, and by agreement with the Architect and Consulting Engineers, a portion of the decorative fittings will be made by Osler & Faraday Ltd and Smith & Ansell Ltd. under the direction of the G.E.C.

THE GENERAL ELECTRIC CO. LTD

Magnet House, Kingsway, London, W.C.2

Volume 117 No. 3039 ELECTRICAL TIMES Thursday, February 2, 1950

EDITORIAL

Discussions at the I.E.E.

THE presentation of an I.E.E. paper is not a matter which is lightly undertaken. Years may have been spent in the acquisition of the necessary knowledge, months of hard work have gone into its actual preparation and revision, while the reading is frequently the worst part of the ordeal. The direct pecuniary rewards are nil, while even the indirect rewards are, at best, problematical. One would imagine, therefore, that the audience, realising the genuine effort which has been expended for their enlightenment, would show their appreciation when discussion time arrives, by confining their criticisms to matters germane to the general issue. No one would suggest that errors of fact should be allowed to pass unchallenged, nor that conflicting theories and ideas should not be thoroughly ventilated. Unfortunately, however, discussions at the I.E.E. are not always confined to these principles. There seems to be a growing tendency to indulge in minor criticisms, almost irrelevant to the theme of the paper. These may arise from undue eagerness to ensure one's firm's interests receive proper publicity or perhaps from purely personal reasons. Discussion time is necessarily limited, and far too valuable to be wasted in trivialities. If we have no real contribution to make towards the sum total of human knowledge, let us leave the field clear for the man who has.

Keeping Local Interest

COMPLAINT has been made that the Area Board reports do not give information concerning the activities of districts, and it has been suggested that the system of published reports should be extended down to district level, reports being made by district managers to Area Boards. This, we feel, is carrying matters too far. While local interest needs encouragement, the amount of additional work and expense involved is totally incommensurate with the prospective advantages. What we would suggest as an alternative is that each district manager should not only be empowered, but encouraged, to present a brief report of activities directly to town councils and local papers in his district. This would succeed in stimulating local interest while keeping the internal work of the Area Boards to an absolute minimum.

Earthing to Water Mains

IN October last, we commented on the earthing problems which might eventually arise due to the use of asbestos composition water mains. Now a further development is upon us in the shape of the polythene service pipe, which is already being installed on a semi-experimental basis for extended tests. As this material should have certain advantages, such as freedom from bursting, we can foresee an eventual large-scale usage, accelerated by the present high price and scarcity of lead. In this case we shall have to reorientate our ideas on the earthing of domestic installations. No longer shall we be able to obtain a satisfactory earth at the cost of a shilling or two for an earth clip. The water pipe, that stalwart friend of the supply industry, is on its way out.

Further Complications

THE most economical alternative is, of course, to earth to the cable sheath. Here, however, a further complication will arise if polythene-sheathed service cables (described in our issue for November 10) come into general use, since we cannot

imagine the armouring—even with aluminium wires—being regarded with favour as an earth conductor. The use of a three-core cable, the next obvious move, will increase costs. Earth plates are expensive—even if several houses are grouped together. Many supply systems do not use multiple earthing, so that earthing to the neutral is not a universal cure. The cost of an earth leakage breaker would be a noticeable item in a housing scheme where a keen price had been quoted. But whatever method is favoured, the problem is one which supply authorities and contractors must face eventually, and the sooner they do so, the better.

That Heat Pump

AS reported on another page, the Ministry of Fuel and Power state that the South Bank Concert Hall is to have a heat pump after all, but it will be only used for a part of the heating. Doubtless, the Ministry had excellent reasons for using i/c engines for driving the compressor, but we should like to hear more about them. Surplus aero engines running on gas may save first cost and the exhaust heat will help to improve the coefficient of performance. But will fast-revving engines designed for high-octane fuel run satisfactorily on gas without extensive modifications? And what of the maintenance problem? Aero engines are usually designed with an eye on maximum performance rather than long life. Bearing in mind that the rest of the Festival seems to be planned to impress foreign visitors with Britain's achievements, regardless of cost, it seems a little strange that a "lash-up" job should be used in an exhibit which will attract so much attention.

The Unofficial Secrets Act

ACTUALLY, we had reliable information regarding this heat pump some time ago, but could obtain no confirmation from the Ministry, who stated that it had not yet been decided to install a heat pump. At his recent Press conference, Mr. Gaitskell complained of "leakages" which had resulted in the publication of inaccurate stories. This, of course, is his own fault. If, as he admitted, there was no particular need for secrecy on any of the developments which the Ministry had in hand, why try to keep them secret? No Ministry in the world can prevent the Press finding out things. If they realised this and would show a little more confidence in the Press's discretion by being freer with information, they would put an end to the half-baked stories of which they complain, and be able to obtain secrecy when it was really necessary.

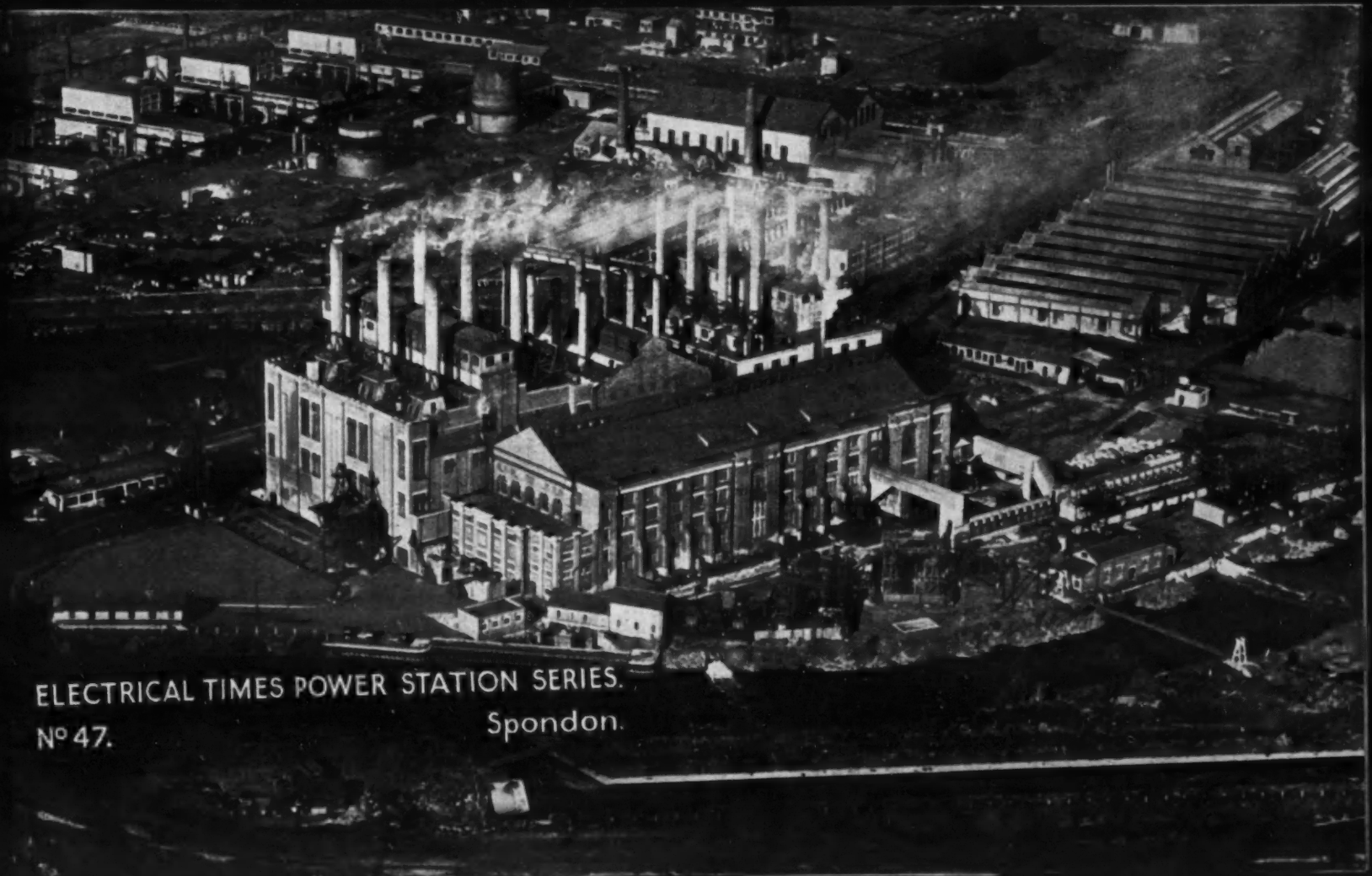
Meteor

THIS WEEK'S PHOTO

SPONDON power station, in its original form, was built in 1917 by a private firm to supply its own factory. Two 6 MW generators, with associated boiler plant, were installed in that year. The station was taken over in 1922 by the Derbyshire and Nottinghamshire Electric Power Co. Extensions have proceeded steadily throughout the intervening years, culminating in the replacement of the original 6 MW generators by a 30 MW machine in 1941, and by a further similar set in 1945. The boiler plant is arranged in three houses, and consists of eight 40,000, eight 80,000 and six 160,000 lb/hr boilers, operating at 375 lb/sq in., and with a final steam temperature of 685° F. on the first sixteen boilers, and 750° F. on the most recent units. Fuel is received by rail and road transport, and handling to or from stock is performed by two electric grabbing cranes, and a diesel-driven excavator, in conjunction with a bulldozer.

The seven generators installed consist of one 12 MW, one 15 MW, one 25 MW, and four 30 MW machines. The first three generate at 6·6 kV, and are coupled directly to the 6·6 kV busbars. Two of the 30 MW machines generate at 6·6 kV, and two at 11 kV, these voltages being stepped up in each case by 40 MVA transformers to 33 kV. Four Davenport cooling towers, each 1½ million gal/hr capacity, are used during dry periods to supplement the supply from the River Derwent. The main switchgear consists of a number of 6·6 kV BTH spring-operated, motor-controlled "O.H." type units, and 18 33 kV units of BTH solenoid operated ABF. 7 type. The former switches continue to give excellent service although originally installed in 1917. The 33 kV switches have a rupturing capacity of 1,500 MVA. The station is connected to the adjacent 132 kV Grid substation by two 33 MVA couplers.

For the year ending November 30, 1949, 839·36 million units were sent out at a load factor of 59·51%. The highest load generated sent out during the same period was 161 MW, the thermal efficiency being 21·78%.



ELECTRICAL TIMES POWER STATION SERIES.
Nº 47.
Spondon.

OUR READERS' VIEWS

Rural Electrification

I hope the accompanying will be of interest and that you can find room for a paragraph relative to the matter.

A new type of farmer is making himself evident—he is the result of agricultural college education and he needs electricity to make it possible to attain the degree of efficiency now demanded by the authorities, and they are telling him it may be many years before supply can reach his premises—a truly Gilbertian position!

Of course, there are difficulties, but they won't be overcome by Consultative Councils in co-operation with Town and Country planners. It is food that the nation is wanting and starvation is a much greater menace than ever was invasion by the enemy—that is why electricity on the farm should be No. 1 Priority.

C. J. Barnett

Late Superintendent,
Central Area, Northmet.

(The enclosure referred to by our correspondent is a copy of the "Dartmouth Chronicle" containing particulars of a petition and a resolution demanding electricity on every farm in the South Hams area, organised by Blackwater Parish Council, in conjunction with leading agriculturalists of the neighbourhood.)

Shift Workers' Qualifications

With the I.E.E.'s banning of correspondence courses for the Associate Membership examination, the position as regards shortage of power station shift workers will, I fancy, be worsened, for the following reasons.

Most shift workers' ambition is promotion from shift work to day work, and this was much easier if they were technically qualified. In the past many unqualified men took on shift work with a view to becoming eligible for a better job.

Now, however, the unqualified shift worker will be unable to obtain certain qualifications by correspondence methods since the I.E.E. have banned them. At the same time, the B.E.A., judging by the way they advertise their vacant positions, seem to indicate that no unqualified person will nowadays stand a chance of promotion. Therefore to make one's way forward it is now necessary to be technically qualified *before* one takes on shift work.

It appears, however, that men fresh from technical colleges and universities, already technically equipped, will not take on shift at any price. And when those who would take on shift work with a view to becoming qualified later on realise that they will not in fact be able to so qualify, then even this type of person will not take on shift work at any price, since he realises that he may stay on shift till he rots.

Hence in the future there will be many new power stations but no worthwhile shift staff to operate them. It seems, therefore, that the B.E.A. should forthwith cut past the usually required qualifications, which, after all, are educational standards asked for by an independent body outside the B.E.A. (and, as such, are that outside body's own concern), and replace them by the B.E.A.'s own educational qualifications.

These qualifications would have to be deemed sufficient for the promotion requirements of the B.E.A. and training for such qualifications should be within the reach of the shift worker—even if it means the B.E.A. running their own correspondence classes, and awarding their own diplomas.

Stanley Thomas

Brighton.

First 11 kV Generators?

In your issue of January 19 Mr. G. B. Melton referred to the early attempts to generate at 11 kV and seemed to imply that Ferranti had generated at 11 kV on a machine about the same size as those installed at North Tees 30 years later. Actually in 1891, a 1,250 h.p. engine generated 10,000 V single-phase current. A 10,000 h.p. engine generating at 10,000 V, on which my grandfather worked, was under construction but was never completed and so never ran.

I always understood that the Bow power station holds pride of place as being the first power station to generate 3-phase current at 11,000 V in 1902. This was on a 1,600 kW alternator which was still running when I was an apprentice there.

A. G. Forgan

Sutton-in-Hull,
Yorks.

REBUILDING THE COMMONS

Extensive Electrical Installation Work in Progress In and Around the Redesigned Chamber

WHEN the decision was taken to make the rebuilt House of Commons chamber the same size as its predecessor, but at the same time to incorporate all the comfort-aiding devices that modern engineering progress has made possible, a difficult problem in electrical installation work was posed. In the immediate surroundings of the 68 ft × 45 ft 6 in. chamber some 25 miles of electrical conduit have been placed in position, in addition to a congested agglomeration of heating and ventilating ducts and pipes, telephone cables, and so on.

In designing the new House the architect, Sir Giles Scott, O.M., PP.R.I.B.A., has kept to a Gothic style in sympathy with the surrounding parts of the Palace of Westminster. Attractively carved woodwork and masonry give to the chamber itself an appropriate atmosphere, and it has, of course, been necessary to ensure that the many services installed do not detract from the effect. For the success achieved in this direction the electrical contractors, Troughton and Young, Ltd., working under the consulting engineers for the whole project, Oscar Faber and Partners, are largely responsible. The difficulties they faced on this project we saw when we were recently privileged to visit the partly finished House.

The Chamber proper lies to the north of the House, and much of the electrical control gear, ventilating and heating equipment is situated in plant rooms to the south. Main electrical supplies, both d.c. and a.c., are taken from a distant switchroom from which the whole Palace of Westminster is to be supplied. It is interesting to note that the Palace is at present being changed from d.c. to a.c. working.

Main Switchboards

Situated in the south-west corner of the House, the main Commons switchroom is provided with control boards along three of its sides. Built by Dorman and Smith, Ltd., these boards deal with d.c., a.c. lighting and a.c. power supplies, and in each case extensive metering facilities are provided. Bus section switches and Castell type interlocks are incorporated in the switchboards as an added safeguard against interruption of supply (Fig. 3).

Cartridge type h.r.c. fuses are used in this board, and on all the subsidiary distribution boards. The English Electric indicating type of fuse link is standard, in conjunction with Dorman and Smith carriers which are pierced through the handle to allow a clear view of the indicating disc.

One plant room directly adjoins the switchroom and various others are situated near by. To these supplies are taken directly. Supplies for the principal rising main, which is placed to the south of the Commons lobby, are taken

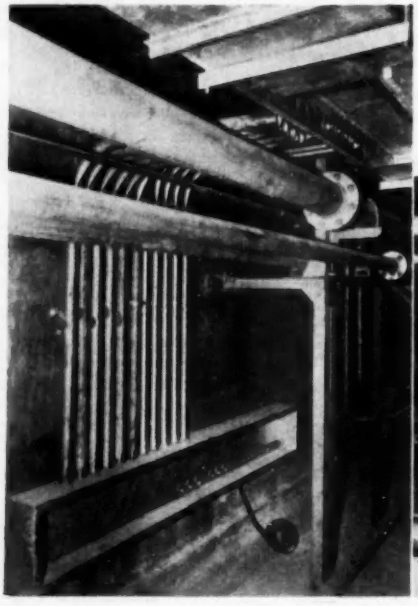
in a long conduit run, suspended on hangers from the roof leading into the central corridor which runs the length of the House well below the Chamber. When the riser vertical duct is reached the conduits are brought into two fabricated sorting boxes, placed one above the other. The upper box is used for the lighting supplies, which are all a.c., while the other box is split into two, a small section for d.c. power and the remainder for a.c. G.P.O. cables and the annunciator circuits (to be dealt with later) are carried up in another riser (Fig. 1).

Boxes and Conduit

Galvanised steel is used for the fabricated boxes, and this material is also employed for all surface conduit runs, heavy gauge tubing being used throughout. Where runs are buried in cement and plaster, copper is the conduit material. Used in standard sizes, it has given little trouble. Easier to set than steel, on account of its relative ductility, it is on the other hand harder on dies because of its toughness. The advantages of copper which led to its choice—typical of the considerations applied in this top class contract—were its relative durability when buried compared with galvanised steel, and the easement it gives to condensation problems.

Two special problems arise with the use of copper. Special care needs to be taken to avoid contact with steel structural members and with the reinforcing bars in the surrounding concrete. Standard practice here has been to apply rubberoid packing when there was any chance of steel and copper touching. The other difficulty concerns the change from a buried to a surface run: from copper to steel conduit. A brass connector is used as an intermediary in these circumstances, but they are fortunately uncommon, since the specification permits the completion in copper of small exposed lengths of runs that are mainly buried.

Supply and lighting cables for the north end of the House leave the back of the main switchroom via another fabricated sorting box (Fig. 1), this time fixed to the wall, and run along the subway under the Chamber in trunking which is supported on hangers from the roof. Divisions in this provide separate paths for a.c. light and a.c. power cables, d.c., annunciator cables and the temperature control lines—five separate spaces in all. The duct lengths are separated with rubber gaskets as a form of dust proofing, and for continuity reliance is placed on the bolts holding the sections together. Inspection plates are provided at intervals along the run, and one other interesting feature of this section of the installation is that its level has to be changed half-way along the subway, resulting in an upwards set of about a foot.



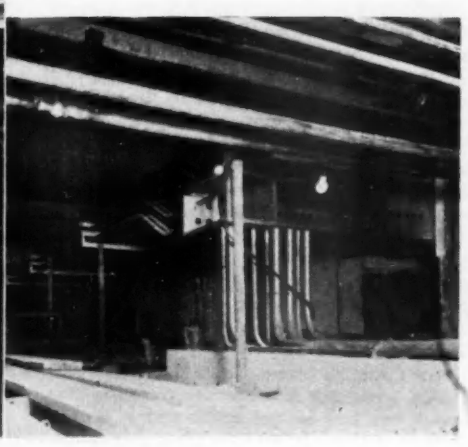


Fig. 1—Left is the sorting box leading into the main switch room, with the trunking above, while below are seen the sorting boxes which come before the cables enter the main vertical riser

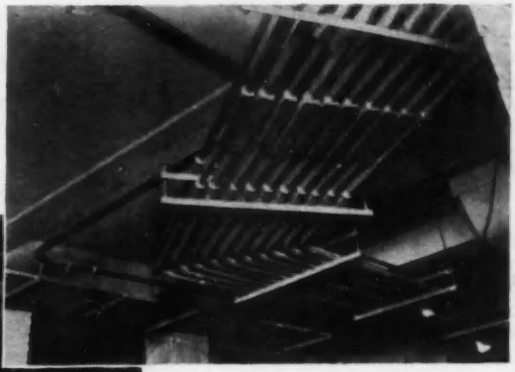
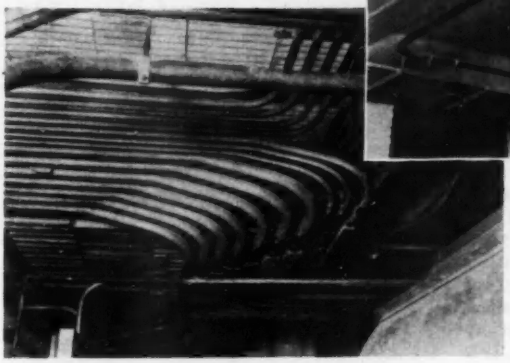


Fig. 2—A typical conduit run with inspection boxes is seen to the right, while just in at the bottom of the picture are some of the annunciator circuit conduits



One of the more complicated examples of conduit setting on the job is shown to the left, where a wide single layer run has to change into a double layer half width assembly because of congestion

All cabling run in the conduit and ducts is 660 V grade v.i.r., supplied by Siemens and by the G.E.C.

Chamber of the House

Having described the ancillary gear, it is now convenient to consider the heart of the House, the Chamber, and its immediate surroundings. Some 46 ft high, this memorable meeting place has a shaped ceiling with a flat centre, to which slope oak beamed planes from all four walls. Above the Chamber ceiling is a small ventilating space, and above that again a 7,000 sq ft office for the Clerk of the House and his staff.

Immediately below the floor of the House is another ventilation space, which is also used for electrical services. Lower still—on true ground level—come Ministers' rooms and conference rooms, and below these a floor given over to secretarial, conference, and interview rooms.

English oak is used for all the joinery in the Chamber and lends a dignified appearance which the electrical incidentals have to maintain. One unobtrusive example of the work of electrical engineering here are the electric clocks, finished in gilder's metal, which have been supplied by Gent and Co. Ltd. (Fig. 5).

Lighting

Cold cathode lighting has been decided upon as the principal illumination for the Chamber. The flat part of the roof is pierced to allow 150 spiral Osram lamps to be used. Further decisions have yet to be made about the final form of this part of the installation, but it is probable that the lamps will operate from behind warm coloured glass panels rather than louvres or some similar construction. (Fig. 6).

Dimming controls are provided on all the lamps, the gear being installed in the ventilating space above the Chamber. At present three feeds are taken into each lamp, the first of which is the a.c. feed to the spiral tube proper. The second circuit is controllable as to voltage, and feeds a bridge connected rectifier. The d.c. output from this saturates a choke in series with the main feed and thus controls the current and consequently the light output of the lamp. The third lead feeds tungsten lamps in the fitting. These have two applications, the first of which is explained by the difficulty experienced in dimming cold cathode lighting smoothly down to extinction. The tungtsen lamps take over in the last stages. The other reason concerns the emergency lighting arrangements for the House, which consist in switching over to a large storage battery. Tungsten lamps included in all appropriate fluorescent fittings can be operated from this source.

Distribution boards for the main lighting units are provided along the east gangway of the roof space, one to each bay of thirty lights. These Dorman Smith boards are supplied from

conduit taken on hangers above the boxes.

Secondary lighting for the Chamber is provided by ordinary hot cathode lamps. Notable positions for these are underneath the galleries and in the sills behind topmost sections of wood-carving that surround the gallery.

Sound

Another electrical feature of the Chamber and one that added greatly to the complexity of the wiring is the provision of loud-speakers connected to a sound amplification system between each two seats, both in the Members' part of the House and in the galleries. The microphones for the sound system will be suspended at vantage points throughout the Chamber.

It is of interest to note that in planning this sound amplification system, which at a few points extends to sections beyond the Chamber, attention has been given to the possible necessity of secret sessions of Parliament. A master switch has been provided which is operated by a key in the charge of the Serjeant-at-Arms. Removal of this key effectually disconnects the amplification system.

Air Conditioning

Ventilation of the Chamber is carried out by introducing air from the sides of the gallery, ducts running under the side galleries and discharging horizontally: other inlets feed the upper part of the Chamber from openings near roof level. Stale air is withdrawn through apertures in the roof, supplemented by additional exhausts in the floor. The air is heated to provide a temperature in the Chamber of about 65° F by day and 70° F at night. The air heating is supplemented by metal panels beneath the carpet, which are kept at a temperature of 80° F to provide foot warming.

Considerable attention has been given to air conditioning, and refrigerated coils are provided for decreasing the humidity when necessary, direct injection of moisture being relied upon when an increase in humidity is required. Electrostatic cleaning is applied to remove all dust particles, the attracting plates themselves being washable to remove deposits.

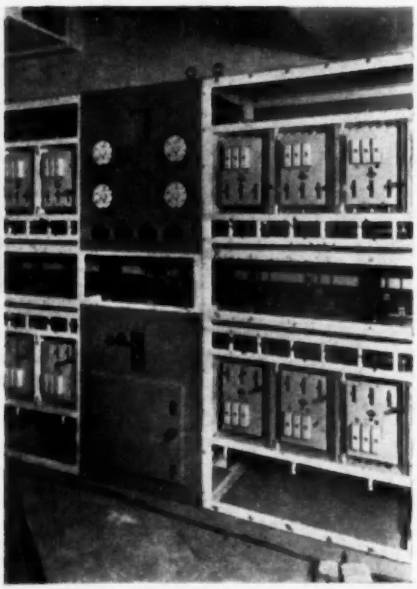


Fig. 3—Power control board in the main switch room

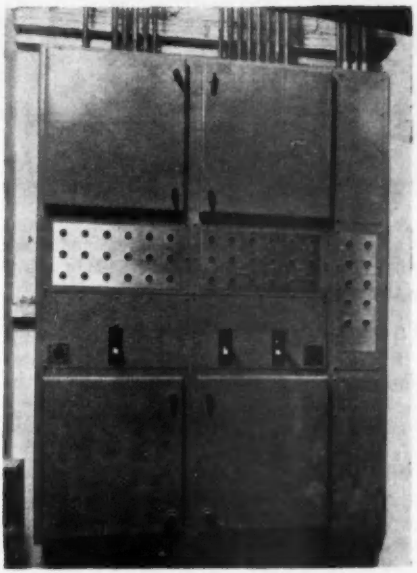


Fig. 4—This distribution board controls all lighting except the Chamber cold cathode lamps

About 1,500 cu. ft of air per occupant per hour is provided in the Chamber, and there is equivalent provision for the other rooms. All in all, eight ventilating plants are used for the House, and the average effect is eight changes of air/hour.

Controls for all the heating, ventilating and lighting services of the Chamber are concentrated in one room below the House, where an engineer will be on duty while the House is

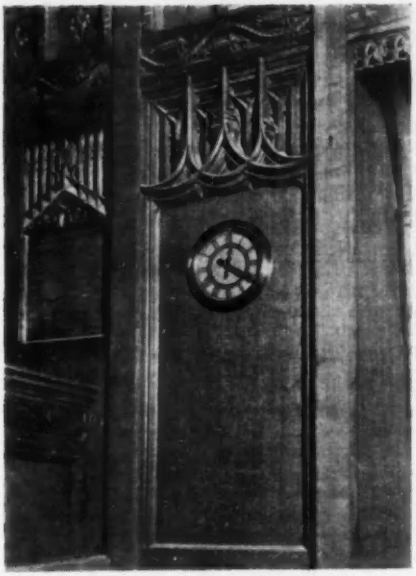


Fig. 5—An example of the carving in the Chamber, with an electric clock inset in one panel

sitting. A submarine-type periscope, which looks through an opening just below the Strangers' Gallery, enables the engineer to observe the number of people in the Chamber at any one time, and to control conditions accordingly. He also has available the dimmer controls for the main lighting, which can be adjusted according to the directions of the Speaker, and the operating switches for the motors which automatically raise and lower the sunblinds of the windows in the Chamber.

At one end of the room is a bank of rheostat type dimmers for the tungsten lighting in the main lamps, while at the far side of the main control board is the master clock that distributes time throughout the House.

Annunciator

One further electrical feature directly involved in the business of the House remains to be described. This is the annunciator system, which gives information about the proceedings in the Chamber at various key points and important rooms. The annunciator is to be operated by an observer stationed in the Strangers' Gallery. When there is any change in the proceedings, he steps into a nearby control room and sets the appropriate information in large metal type in a travelling carriage. The carriage then passes beneath a set of seven contacts, the type thus completing a circuit between a battery and corresponding operating coils at the various annunciator stations. Inking rollers are depressed by these, and the information thus spelt out on a travelling strip of paper, and displayed on annunciator boards. The letters are built up of small squares, one to each ink roller.

Lift Services

As will have been clear from the foregoing description, there is much to the House of Commons besides the Chamber, and in order to facilitate movement eight new electric lifts have been installed, in addition to three hand-power service lifts. J. and E. Hall Ltd. are responsible for all these, but only the electrically powered units will be dealt with here.

Seven of the lifts are used for passenger service, the speeds being 120 ft/min, 250 ft/min and five at 200 ft/min. All are provided with two-speed sliding doors arranged for electrical power opening and closing. Features peculiar to the House of Commons installation are the ventilation system used for the motors, and the method of control.

Super-silent tandem motors manufactured by Bull Motors Ltd. are used, and they have a 6 : 1 speed ratio between high and low speed windings. Since the original specification called for 180 starts/hour within the limits of temperature rise laid down by B.S.168, 1936, the motors are provided with an exhaust fan which is switched on during busy periods. Tests carried

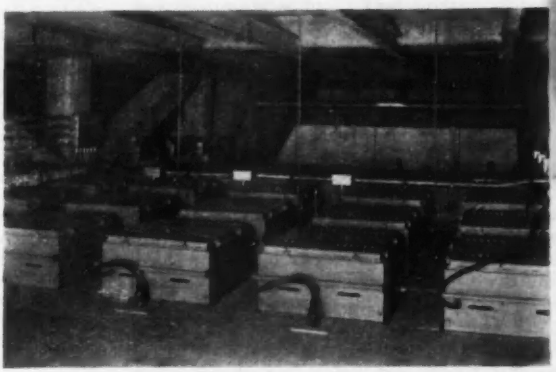


Fig. 6—Control gear for the cold cathode lamps in the Chamber ceiling

out with such a motor on an 80 ft test tower lift showed that with 330 starts/hour—one every 11 seconds—for four hours, the motor proved completely satisfactory.

Control

The lifts can be operated either by passengers or by an attendant. A changeover switch allows selection of system. For passenger control, they are of the fully-automatic push-button type. When an attendant is in charge a more complicated system operates. An intending passenger pushes a button indicating whether he requires to travel up or down, and his call is registered on an indicator in the car. The attendant accepts the call by pressing a button. The lift doors close and the lift proceeds. Further calls for the lift going in the same direction are automatically registered, and if they are accepted by the attendant the lift stops at the calling floor without further action by the attendant, and the lift doors open. With this method, false calls and overshooting are claimed to be impossible.

Slowing down of the lift is carried out automatically by a two-speed chain-driven selector, but levelling is performed by electronic means. A valve, capacitor and coils mounted on the top of the car comprise the apparatus. As the lift approaches a floor, a steel plate mounted in the shaft comes between the projecting coils, and a current is thus caused to flow which energises a micro relay mounted on the lift control panel, and thus keeps the lift motor working at its slow speed until accurate levels are obtained.

The seven lifts with speeds of 200 ft/min or more are equipped with governor-operated wedge-clamp safety gears. The eighth lift is used for both passenger and goods service, and differs in that it does not have power operation of the sliding doors, and has been designed to withstand harder service than the other units.

Conclusion

As the account of the engineering services shows, quality—the highest possible quality—is the keynote in the construction of the new House of Commons. For the engineering services, to which the greater part of this article has been devoted, two other requirements have had to be fulfilled—compactness and unobtrusiveness. The need for the first was such that the positions of all pipes, conduits, ducts and trunking had to be accurately arranged by the various contractors before installation work began. An inspection of the ventilation spaces and the other really congested areas confirms the need that existed for this time-consuming preliminary planning.

With regard to keeping the services unobtrusive, concealment has been relatively simple—though bringing electrical circuits to the Speaker's chair and the table of the House created some tricky problems—and most attention has had to be devoted to preventing transmission of machinery noise to the Chamber and its surrounding rooms and corridors.

Contractors

The following firms and individuals concerned in the re-building of the House are mentioned above:—

Architect: Sir Giles Scott, O.M., PP.R.I.B.A.

Consulting Engineer: Dr. Oscar Faber.

Electrical Installation: Troughton and Young, Ltd.

Lifts: J. and E. Hall, Ltd.

Chamber Lighting: The General Electric Co., Ltd.

Heating and Ventilating: Benham and Sons, Ltd.

N.P.L. JUBILEE EXHIBITION

IT was in January 1899 that Dr. R. T. Glazebrook was appointed as the first Director of the National Physical Laboratory; this present year therefore sees the end of fifty years of work on basic physical standardization and testing. To celebrate this jubilee, an exhibition was held last Monday in the rooms of the Royal Society at Burlington House, Piccadilly, illustrating the development of the work of the laboratories. Whilst, of course, much of the exhibition was devoted to the work done in metallurgy, aerodynamics, light, metrology, ships, and the standards of length, weight and time, a certain amount was of more direct electrical import. To anyone interested in the standardisation of electrical units, the historical collection of early standard instruments was worthy of attention. More modern techniques were exemplified by the testing assembly for the units which went to make up the Automatic Computing Engine, and a good idea of the principles and operation of this type of electronic binary calculator could be gained, not only from the test panel, but also from a schematic working model which illustrated the sequence of simple programming for straightforward computations. Work being carried out on radioactivity was also illustrated by Geiger counters, etc., set to show various levels.

A joint reception by the Royal Society and the Government was held in the evening when the Lord President of the Council, Mr. Morrison, and President of the Royal Society, Sir Robert Robinson, received the guests.

MANUFACTURING PROGRESS IN 1949

No. 7—English Electric Co. Ltd.

AMONG large turbo-alternators completed in 1949 was the 60 MW hydrogen-cooled set for Stourport. The steam conditions for this unit are 1,250 lb/sq. in at 950° F. The Ferrybridge 45 MW set was also completed, and nearing completion are two standard 30 MW units for West Ham. Fulham station received a 60 MW "S.R. & O." set using 900 lb/sq in. at 900° F steam conditions, and an interesting unit being manufactured is a 60 MW set with steam at 1,500 lb/sq. in. 1,050° F.

Export orders include two 30 MW sets for Pretoria "B"; five 30 MW units for the Electricity Supply Commission of South Africa; and a third 31·5 MW set for Abadan for the Anglo-Iranian Oil Co.

The hydro-electric plant side has been particularly active with new orders for the North of Scotland H.-E. Board totalling 90·5 MW, as well as with those machines already ordered for Loch Sloy (four 45,500 h.p.) and Mullardoch-Fasnakyle-Affric (three 31,500 h.p.).

Considerable orders have been received from many countries abroad. For Spain there are four 34,000 h.p. vertical reaction turbines and alternators for Salime and also two 12,850 h.p. similar type sets for Picazo. Ceylon has ordered three 22,000 h.p. horizontal impulse turbines, and an order has been received from Canada for two 33,000 h.p. vertical reaction turbines to be made in that country by John Inglis. Work nearing completion or completed abroad includes the erection of the 30,000/35,000 h.p. vertical feathering propellor unit for Tekapo, New Zealand and the completion of the four 16,700 h.p. horizontal impulse sets which are now running at Waddamana, Tasmania.

Split contracts for abroad include the three 73,000 h.p. vertical reaction turbines for Castelo de Bode and three 39,000 h.p. horizontal impulse units for Vila Nova, both in Portugal. The alternators in these schemes will be made by Metropolitan-Vickers.

Transformers and Switchgear

The most interesting transformers ordered are the ones for service on the experimental 275 kV B.E.A. line at West Melton and Staythorpe. Exports of transformers were made to South Australia (132 kV, 10 MVA); New South Wales Railways (120 kV, 132 kV, 138kV —ratings: 30-50 MVA); South Africa (30 and 88 kV—20 and 15 MVA); and Finland (34·5 kV—40 MVA).

Oil break switchgear continues to be in steady demand and several large orders were received. Orders fulfilled included more than three hundred 3·3 kV o.c.b.'s for eleven pumping stations in Iraq and among large overseas orders is one for ten complete outdoor substations with o.c.b.'s of 33, 66 and 132 kV.

Orders were received for air-blast circuit breakers representative of the complete range made by the company, including 132 kV circuit-breakers for Australia, 132 kV and 11 kV for Spain and 1,000 MVA units for the South Wales Electricity Board. During the latter part of the year, delivery began of the 16-132 kV, 2,500 MVA outdoor air-blast breakers for Beddington. Many large orders for medium voltage air-break switchgear were also received.

Rectifiers

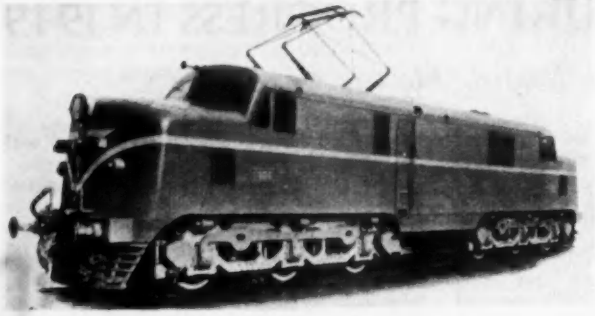
A considerable quantity of rectifier business was obtained during the year and a large part of this covers equipment for export.

Railway electrification provided the major demand for mercury-arc rectifiers and orders received included fourteen 1,200 kW 1,500 V d.c. pumpless air-cooled steel tank equipments for the Netherlands Railways and twenty-two 750 kW equipments for the Polish State Railways, which are to be used initially at 800 V d.c. for electrification of the Danzig-Gdynia line, and later at 1,600 V. A further order for the Polish State Railways covers a 2,500 kW 3,300 V rectifier to increase the capacity of a pre-war substation feeding the Warsaw suburban railway system. The 12,000 kW of 3,000 V air-cooled pumpless steel tank equipments to electrify the Estrada de Ferro Santos a Jundial, Brazil, were delivered last year.

In the high-voltage rectifier field orders have been received from Denmark, Finland, Holland and the British Broadcasting Corporation, (for Daventry) for equipments to give high-voltage supplies to radio transmitters. An equipment of the same type and rated at 300 kW 12,000 V d.c. has been installed at Birmingham University to feed a cyclotron; this is the second application of this nature and follows successful operation of an equipment at the Cavendish Laboratory for the past four years.

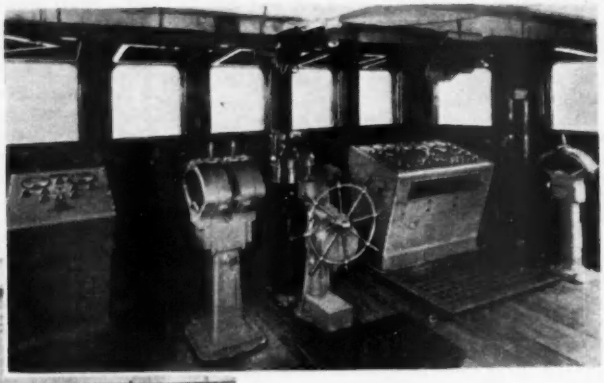
The complete success of the pumpless air-cooled steel tank rectifiers for all rectifying duties has been amply demonstrated over the past 10 years and in addition to traction and general industrial applications, they are now being extensively used in the electro-chemical industry; for example, a third order has been received from a copper refinery in Northern Rhodesia for a 10,000 amp 325 V equipment.

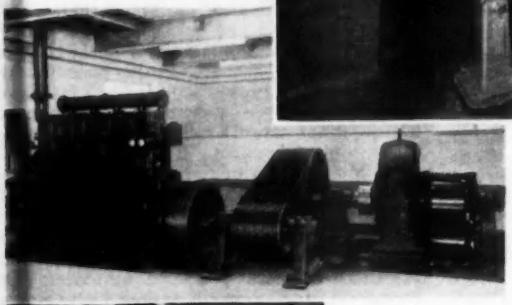
Other orders cover six 400 kW 550 V equipments for the Johannesburg trolley-bus system, equipments having a total rating of 2,550 kW for Amsterdam, many equipments for steel mills for supplying both main mill drives and



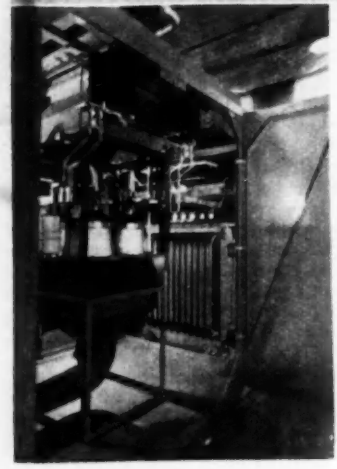
On left: One of the fifteen 3,000 h.p. 3,000 volts d.c. main line electric locomotives being built for the Estrada de Ferro Santos a Jundiai, Brazil, by The English Electric Company in collaboration with the Vulcan Foundry Ltd.

On right: Bridge of the diesel-electric dredger "M.O.P. 225C," showing the control desks.





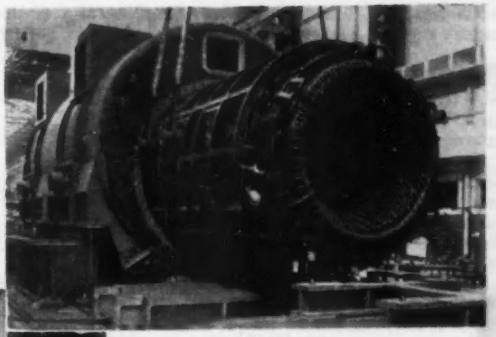
On left: An English Electric 4-cylinder dual fuel engine type 'RKD' in the power house of a cycle accessories factory



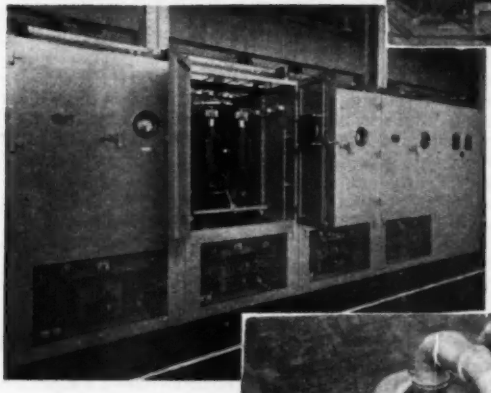
On left:
English Electric 50 kW electronic induction heater for the surface heating, brazing and melting of metals

On right:
English Electric variable-speed commutator motor with automatic regulator for ring spinning

Right: The inner stator of the 60,000 kW hydrogen-cooled alternator for Stourport station being assembled in its outer casing at Stafford Works

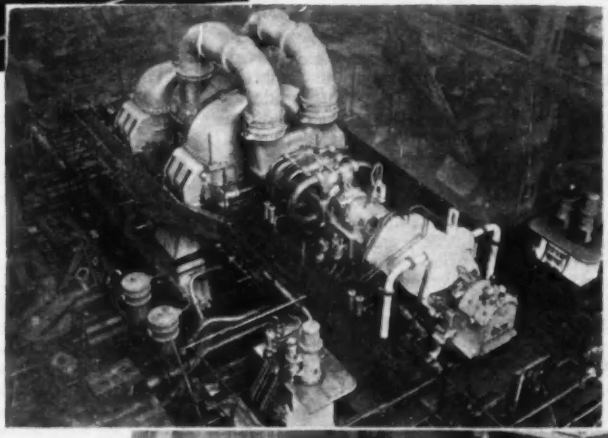


Below: A 2,000 kW bank of mercury arc rectifiers for the 3,000 volt d.c. electrification of the Estrada de Ferro Santos a Jundiai, Brazil

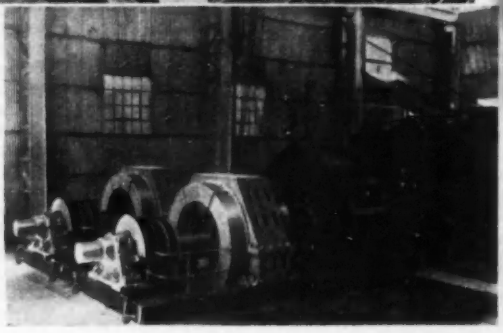


Below: The 60,000 kW 3,000 r.p.m. 3-cylinder steam turbine for Stourport power station on test at Rugby.

Bottom right: Double-drum hoist at a South African mine, driven by two a.c. motors totalling 3,260 h.p.



Below: An example of domestic apparatus. Food Mixer and juice extractor which has infinitely variable speed up to the maximum



auxiliaries, and other equipments for general factory supplies.

Rolling Mill Plant

Activity in the application of electricity to the metal industries was considerable, particularly in connection with steel production.

A number of heavy rolling mill drives were completed, including those for two hot reversing mills with torque ratings of 1,470,000 and 1,700,000 lb-ft respectively. A third drive of 3,600,000 lb-ft maximum torque rating, the largest so far in Great Britain, was nearing completion in December. A similar drive was supplied to Australia, the motor rating being 265,000 lb-ft maximum torque at base speed, and the speed range being 30/45 r.p.m.

Another major plant for overseas includes a 300 h.p. a.c. scalebreaker drive, a 1,100 h.p. a.c. roughing stand drive, a 1,500 h.p. d.c. intermediate stand drive, and three 1,200 h.p. and two 675 h.p. d.c. finishing stand drives, together with edger drives and several motor-generator and exciter sets.

One of the rod and billet mill drives supplied has 14 d.c. motors side-by-side, totalling 6,050 h.p., fed from two rectifier banks. These rectifiers are of the company's pumpless air-cooled steel bulb type; grid control is used for starting the motors, and on-load voltage control is provided down to 50% rated volts by an on-load tap changer working in conjunction with grid control to give continuous variation.

Another mill will have 10 d.c. motors side-by-side, but in two groups, for roughing and finishing billets. These 10 motors total about 9,000 h.p. and will be fed from two rectifier banks.

A 7,000 h.p. hot reversing drive for a blooming mill, 50/120 r.p.m., ordered for Australia, has a maximum torque of 2,200,000 lb-ft and is largely a repetition of earlier orders. This brings to a total of four the number of English Electric large hot reversing drives operated by this one user; drives which are in many ways interchangeable with one another.

Electric Mining Plant

In February, 1949, the first twin a.c. hoist in the world with series connected rotors was commissioned in South Africa, the electrical equipment being supplied by the English Electric Company. The combined r.m.s. rating of the hoist is 3,260 h.p. and composite excitation d.c. dynamic braking is incorporated. Further substantiation of the efficiency and reliability of the system of d.c. dynamic braking employed is afforded by the fact that five of these braking equipments are on order for operation on existing hoists where the driving motor is not of English Electric manufacture.

Amongst the most interesting orders for plant for home duty is one for a 2,515 h.p. Ward-Leonard controlled direct coupled Koepe pulley hoist and one for a 1,750 h.p. geared a.c. hoist with d.c. dynamic braking. The former equipment will have a 23-ft diameter pulley and will raise 245 tons of coal per hour from an ultimate depth of 3,420 ft at a maximum speed of 3,000 ft per minute. The a.c. hoist will be the first electric hoist to be supplied in the North Staffordshire area and will also be the largest a.c. hoist in England and Wales. This skip hoist will raise 350 tons per hour from a depth of 1,590 ft with a maximum rope speed of 1,764 ft per minute. Both these equipments will be fitted with modern type control desks.

Among the orders received for overseas is one for a B.C.C. drum geared a.c. hoist for West Africa which will be the largest equipment in that area. Another interesting order is that for a 528 h.p. staple pit a.c. Koepe pulley hoist.

Textile Electrical Equipment

Having effected the electrification of woollen mills in Leicester amounting to approximately 1,500 h.p. in individual motor drives, the company is now to carry out the steam to electric drive conversion of mills for the same owners at Nuneaton, involving some 200 individual units totalling approximately 1,000 h.p.

The company has also undertaken the conversion from steam to electric drive of cotton mills in Rochdale involving some 200 individual motor drives, including special high-torque motors mounted into the frames of the flat carding engines, complete with clutches and reversing gear.

The new English Electric type LVR 6522/6 variable speed commutator motor for ring spinning was introduced to the textile trade in June, after 18 months rigorous testing under actual spinning conditions in a Manchester mill. Its main features are that it can increase the spinning production of existing ring spinning frames by 15% when compared with the usual constant speed motor driven machine. It also greatly reduces the yarn breakage rate.

Transport and Domestic

Both diesel and straight electric locomotives are on order, the former for Egypt, Brazil, British Railways, the Sudan, Holland and Tasmania, and the latter for British Railways, Australia and Poland.

Marine work was mainly confined to the completion of the supply of machinery for the first two of four dredgers for the Ministry of Public Works, Argentina—one of the largest contracts ever placed in this country for diesel-electric marine propulsion and pumping equipment.

Production of English Electric domestic appliances was maintained at a high level, the refrigeration side being particularly successful. Over 60% of the latter production went to the overseas market.

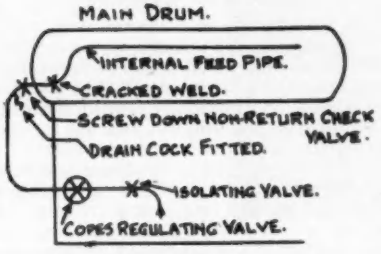
In the domestic field, the company also began the production of a 15-in diameter tube television receiver. This is being produced in conjunction with its famous subsidiary, Marconi's Wireless Telegraph Co.

PROBLEMS and PRACTICE

In Engineering

Boiler Weld Failure

IN a power station working on a two-shift basis a leading stoker recently reported that whenever he attempted to top up one particular boiler during the night there was a severe hammering in the feed line. This was investigated and confirmed; moreover, it was proved only to be the case when attempting to feed the boiler after it had been banked for some while. As time wore on and the hammering got worse, many theories were advanced and attempts



Line diagram of boiler drum feed

made to clear the trouble. The layout was as shown in the accompanying diagram and the normal mode of operation was to leave the check open and operate on the Cope's isolating valve. The first suggestion was that the check valve was sticking shut and opening with a rush after full pressure had built up behind it, but examination proved it to be in perfect order. Next it was suggested that the vertical leg with a non-return at the top was draining itself off after the last feed pump had been shut down, and leaving a pocket of air which in some way was causing a water hammer. To obviate this, a drain cock was fitted as shown, and with the check shut by hand every last vestige of air was drained off before gently cracking the valve to admit water to the drum. But one attempt was enough for the man operating the check!

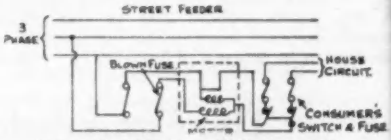
As the lagging had all been shaken from the feed range by this time and everyone concerned was becoming thoroughly scared of making any attempt to top up the boiler, it was decided that in spite of heavy winter loadings it had to be shut down for further investigation. When this was done it was discovered that a weld in the internal feed pipe had cracked below the normal water level in the drum, this resulting in a spurt of relatively cold water being allowed into immediate contact with the water already in the drum and the disturbance being transmitted back to the feed line, which, not being supported too rigidly at the best of times, magnified the shock into startling proportions.

The explanation of the fact that no trouble was experienced during the normal steaming of the boiler was simply that once it was on load the economiser was heating the feed water to within a few degrees of the saturated steam temperature, and consequently there was no cause for disturbance. When the boiler was banked and fed with water at the temperature of the storage tanks without even the advantage of the heaters, then the temperature difference could be as much as 200° F.—*Living and Learning.*

Test Lamp Lies

I WAS recently called to a failure to lights in a consumer's house (the house being fed by two phases of a three-phase delta distribution).

Firstly, I inspected the fuses and found that they were quite in good order. I had at the time a Testerscope screw-driver, I tested both live sides of the D.P. fuses switch and found that I got a light from both, which for this system was quite in order: yet, not a light would burn in the house. Insulation was good, free from any earth, and there was complete continuity.



Schematic of 3-phase, 3-wire connections

What was the trouble? I came to the conclusion that the service fuses were the trouble, in fact, one of them had "blown" and the two-phases of the consumer's supply were being fed from one phase via the pressure coil in the meter as shown in sketch.—*C. Taylor.*

Portable Transformer

IT seems a common assumption that a maintenance electrician is shockproof. Failing to agree with this assumption, the writer constructed a portable transformer. Shell type stampings were used, size 5¼ in.×4¼ in. and giving a thickness, when clamped, of 1¾ in. The primary was wound with 26 s.w.g. d.c.c., and the secondary with 14 s.w.g. d.c.c., and three tappings taken giving 6 V, 12 V, and 24 V. Care was taken to provide adequate insulation between primary and secondary, plus the usual varnish impregnation and baking. Ratios will, of course, vary with the voltage of the available supply mains.

The complete transformer, plus angle strip feet, was mounted in a stout wooden carrying case, and for convenience a bakelite tumbler switch was fixed on the case side to control the input. Twelve yards of twin flexible c.t.s. terminating in a bakelite lampholder adaptor enabled the transformer to be plugged into any adjacent lampholder. The transformer end of the feeder cable was led through a hole in the box, and secured by a clamp. Four screw-down terminals spaced on a plastic strip marked 0, 6 V, 12 V, and 24 V were secured on the side of the case opposite the switch, and the various connections made. Two ventilating holes ¾ in. dia. were drilled top and bottom on the two blank sides of the case.

As the transformer was unearthed, the screws securing its angle strip feet were sunk into the base of the case, waxed over, and covered with a sheet of plastic insulating material, secured at each corner by a screw which also served to local a rubber buffer, or foot. A screw-down wooden lid, and stout leather carrying strap screwed to the case, plus painting, completed the portable transformer External dimensions 6 in.×6 in.×6¾ in. height. Weight of complete outfit 12 lb.

Apart from feeding a low voltage inspection lamp, soldering iron, and a small drill, etc., it will be agreed that many forms of continuity tests can only be carried out efficiently with a low voltage supply.—*F. R. S.*

A Case of Burned Contacts

FOR some time a number of d.c. contactors had given trouble due to the contacts rapidly burning away. The line current was checked in each case and found to be well below the normal rating of the contactors. It was then noticed that the blowouts were of the permanent magnet type, and the reason for the burned contacts was clear. The main cables to the main fuseboard had at some time been reversed; after correcting the polarity no further trouble was experienced.

It is surprising the number of occasions on which this fault crops up, although manufacturers invariably clearly mark the polarity of connection on this type of contactor.

Quite a few engineers fail to realise that whereas the line polarity of a wound blowout contactor can be changed with impunity, a permanently polarised blowout contactor must be correctly connected, otherwise the arc, instead of being blown upwards and out, will be deflected down and maintained.—*W. H. R.*

They'll do Anything !

AN iron, in use in a kitchen with a stone floor, gave me a shock very much to my surprise, as prior to additions to the wiring no complaint had been made. When I questioned the householder, an elderly woman, she told me that whenever the iron was used she instructed her servants to stand on a rubber mat!

The failure was due to the connection between the element and the tag burning off, burning through the mica, and going to earth. The neutral was broken, but the iron was usable since the circuit was completed via the earthing. —*H. M.*

Contributions to this feature, dealing with specific problems and items of interest to practical engineers are welcome, and will be paid for at our standard rates. Items should be brief, and preferably accompanied by diagrams or sketches, which will be redrawn for publication.

Contributors should state whether or not their names are to be published if their notes are accepted.

The Commissioners' Final Report

ALTHOUGH outdated by the publication of the first year's working of the nationalised industry, the Twenty-Third and Final Report of the Electricity Commissioners, covering the period from April 1, 1947, to July 31, 1948, contains much of general interest. This is mainly due to the fact that it includes a brief review of the Commissioners' Administration from 1920-1948. This shows clearly the development of the excellent administration and organisation of the supply industry during the period, as well as the continuous progress made from a technical viewpoint. It is pointed out that although the increase in consumption was primarily due to the efforts of the undertakings themselves, they must also be attributed in part to the influence exercised by the Commissioners in carrying out the specific duties imposed on them by Parliament and also the more general function of promoting the supply of electricity.

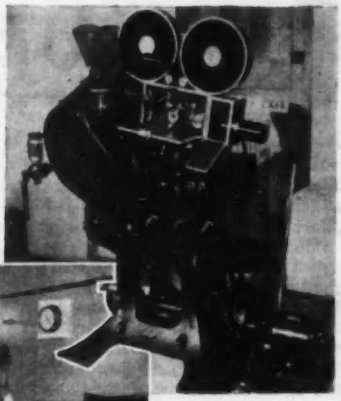
Turning to the main subject—the transition period from April, 1947, to July, 1948, the report comments on the difficulties of supply of generating plant and auxiliary equipment, the peak load problem and the methods devised to alleviate its effects and the difficulties caused by the transfer of undertakings into the B.E.A. To overcome the latter the Commission remained in being and continued to advise the Minister until three months after vesting date, although their judicial functions were greatly diminished owing to the repeal of the Acts, on vesting date, which gave them their authority.

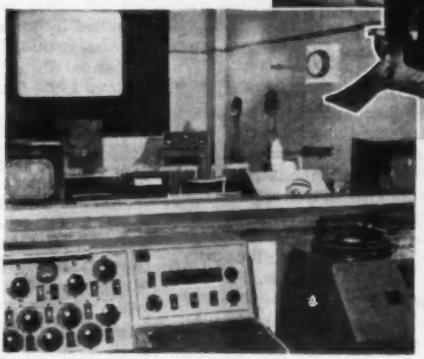
The report continues by giving statistics dealing with generation, and plant capacity sanctioned; details of various constructional and distribution schemes submitted to the Commissioners (these were mainly concerned with the North of Scotland Hydro-Electric Board); consents for transmission lines; special orders; particulars of loans sanctioned; certification of meters; special war-time measures and applications for overhead lines and wayleaves. The usual comprehensive appendices are included.

TELEVISION PROGRESS

New Equipment at Alexandra Palace

NEW facilities have recently been made available at Alexandra Palace for the production of films used in connection with television programmes. These include a film dubbing suite where (a) sound can be recorded in synchronism with a film camera operating in the dubbing theatre or in one of the studios; (b) sound can be dubbed on to a silent shot; (c) sound can be transferred from disc to film track; and (d) live sound can be added to a transmission of a silent film.





Above is a view of one of the special cameras for recording telefilms. At the left is a view of the control desk and projection cinema for dubbing purposes

The projectors and sound film reproducers in the projection room are driven by Selsyn motors fed from a master Selsyn generator and hence keep exactly in step. Synchronism between these machines and the sound-on-film recording machine is achieved by driving the recording machine and the master Selsyn generator by synchronous motors supplied by an electronically controlled motor alternator. set. The frequency of this machine can be varied to give either 24 frames/sec. or 25 frames sec. as required, but once set the frequency remains constant within ±0·1%.

Telefilm Recording

As many viewers appreciate, the photographic recording of a television picture presents unusual difficulties, as at any instant the picture is only a spot of light. Two special cameras have been built and are installed for this purpose. Instead of the usual intermittent movement, these machines have a continuous film travel, the image being moved with the film by means of an optical system of rotating and rocking mirrors. By this means a continuous exposure is possible and two complete interlaced frame scans are recorded on one film frame.

The picture monitors use 12-in. tubes giving a white fluorescence, and an unusual feature is that the scanning spot can be displaced in a vertical direction with small amplitude at a frequency several times higher than the detail frequency of the picture; this, when correctly adjusted, virtually eliminates the line structure.

Other machines now in use include two E.M.I. film scanners and a Cintel machine of the same type. These give a much better definition and tonal gradation, and the quality of the picture is less affected by the density of the film.

Polytetrafluorethylene

FURTHER developments in the application of PTFE, or polytetrafluorethylene, were demonstrated at a press conference held by Crane Packing Ltd., Slough (a Tube Investments subsidiary), last Thursday. The plastic in question, which the company market under the designation "C.F.2.", has already been referred to in these pages, and can best be described as having electrical properties and appearance similar to those of polythene, but with the additional ability to withstand temperatures from −60° F to 450° F, an even greater degree of chemical inertness, and complete freedom from tracking. Its chief applications are in connection with corrosive liquids at elevated temperatures, and it is produced in a wide variety of gland packings, pipe jointings and valve seatings for mechanical seals. In addition, Crane Packing Ltd. are producing it in tape form in a range of widths and thicknesses. Its chief electrical use is in situations where high frequencies are combined with elevated temperatures, as its power factor (0·0002 over a wide frequency range) is comparable with that of other low-loss materials which are unable to withstand high temperatures.

OVERSEAS NEWS

A Claim in Cairo

Through their Cairo agent, the Westinghouse Electric International Co. is shortly to bring an action against the Egyptian Government in an effort to have restored to the firm a contract valued at £1,700,000 for equipment for the North Cairo power station, it is reported. Apparently the Westinghouse Co. was awarded the contract, but that decision was cancelled and the tender of the Alsthom Co., of France, accepted, payment to the latter concern being made in Egyptian pounds. In a written plea which will come before the court, the agent for Westinghouse claims that "factors not related to public interest led to the acceptance of the French firm's offer." The Egyptian Government contends that the matter is not one coming within the jurisdiction of Administrative Courts, and denies an allegation that political differences and influences led to a reversal of the early decision.

Vancouver's Problem

Citizens of Vancouver are to be given the opportunity to vote on the question of whether the City Council should acquire the electricity undertaking in its area now operated by the British Columbia Electric Railway Co. The Mayor has stated that under the terms of the franchise agreement, notice must be given by December 30 next if it is intended to purchase the undertaking.

Prince Edward Island

On the basis of population, Prince Edward Island is far ahead of the rest of Canada as far as rural electrification is concerned, Mr. B. A. Ainsworth, general manager of the Maritime Electric Co., declared at a recent local meeting. At present about 3,750 rural homes were connected, he stated, while the company plans extensions amounting to about 500 miles of lines, to add a further 3,000 or 3,500 consumers during the next five years.

Production in Germany

Before the war, Germany was a large exporter of electrical goods, and imported an almost insignificant amount of such apparatus. The position has changed, however, and today she imports substantial quantities. These imports are being brought into the West German Federal Republic both to fill gaps in the domestic production schedule and to implement obligations entered into under reciprocal trade agreements with various countries. The imports consist largely of parts, and thus aid the domestic industry, but also contain a proportion of finished products. Approximately 39% of such electrical goods exports were supplied by the sterling area last year, and 57% by Continental European countries, it is stated. The West German electrical goods industry so far has regained only a fraction of its pre-war markets. Whereas in 1938 shipments abroad were valued at 240 million Reichsmarks, last year's exports amounted to only 80 million Deutschmarks. Today's export proportion is only 2% of total production, whereas 10% was absorbed by foreign markets in the last complete pre-war year. Further, whereas electrical goods accounted for 6% of Germany's overall export trade in 1938, they constitute only 2·5% today.

Austrian Scheme

The Austrian Cabinet last week agreed that a plan for the construction of a large power station on the Inn, near Braunau in Upper Austria, be submitted to the O.E.E.C. in Paris for their consent. The scheme provides for the creation of a special joint Austro-German company to carry through the project and to exploit the new source of electric power. It is hoped that most of the capital needed will be provided from E.C.A. counterpart funds.

Development in Central Provinces

In the Central Provinces, recent surveys indicate a load potential of 240 MW prospective and 129 MW firm by 1955, and 346 MW prospective and 161 MW firm by 1960. There are, of course, a number of local industries, including textile, rice, oil, cement, newsprint, coal, aluminium and steel. At present there is a generating capacity of only 45,370 kW available in the area of over 100,000 square miles. In the scheme of power development planned, the province has been divided into three grid areas: southern, northern and eastern; and eventually the grid systems will be interconnected with provincial lines. There is in operation a five-year plan of power development, commenced in 1948, which is intended to provide the nucleus of a state electricity supply system. The Provinces river systems—the Narmada, Tapti, Mahanadi, Wardha, Wain-gauge and Indravati—lend themselves to hydro-electric development, but in view of the heavy capital expenditure involved in such schemes, it is proposed initially to set up a few large central thermal stations.

Indian Power Production

The total production of hydro-electric power in India in 1948-49 amounted to nearly 2,400 million units. It was expected that the figure would be increased by 138 millions in the year 1949-50. This information was given in the Indian Parliament recently by the Minister for Works, Mines and Power, who emphasised that the total output of both hydro-electric and thermal stations would be 80% higher when all the schemes now in hand or contemplated were in operation.

Indian Electric Railways

Replying to a question in Parliament, the Indian Minister for Railways and Transport stated that the total electrified route mileage of Indian railways was 235·99 miles. This mileage includes the following large sections:—

S.I.R. (Madras Beach to Tambaram), 18·14 miles;

G.I.P. (Bombay to Poona and Kalyan to Igatpuri), 108·05 miles; and

B.B. & C.I. (Bombay Churchgate to Virar), 36·80 miles.

The Minister added that schemes for the expansion of electric railways for long distances in India were under examination.

Waitaki Extensions

The construction of an additional generating plant to increase the present output of the Waitaki power station, New Zealand, by another 30,000 kW would soon be started as an extension to the present power house on the Otago bank of the Waitaki river, the Minister of Works announced last month. The additions to the power house at Waitaki will be built with the object of filling the gap which it is estimated will occur in the South Island power supply between 1953 and the time when the new 300,000 kW plant at Roxburgh comes into production. The additional plant at Waitaki will consist of two 15,000 kW generators. The installation has been made possible by the increase in water power available, as a result of the construction of the water storage projects at Lakes Pukaki and Tekapo.

The Benmore Scheme

During a visit last month to various hydro-electric installations in the South Island, New Zealand, the Minister of Works stated that investigations were in hand for the erection of a 300,000 kW station at Black Jack's Point, which is to be known in future as the Benmore scheme. The site of this station is on the Waitaki river at a point where there is a U-bend. The proposal is to divert the river through the bend, thus leaving a loop for the construction of the dam high enough to permit the generation of approximately 300,000 kW. The Minister said that the scheme lent itself to ready development. Water would be led to the powerhouse by a series of tunnels and pipe lines through the ridge, and this portion could be carried out independently of the diversion. A further point was that by the time construction could be started on the site, control of Lakes Tekapo and Pukaki would have been effected and this would facilitate the time construction could commence on the site.

Bloemfontein Extensions

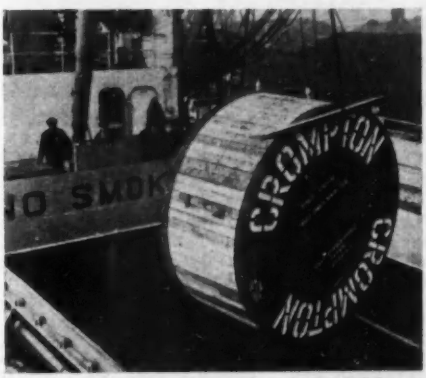
Discussions have been taking place recently concerning the projected extensions of the Bloemfontein power station, Mr. J. R. Beard, senior partner of Merz and McLellan, has been conferring with the city electrical engineer and members of the Council. The additions to the power station are planned to meet the needs of the city for the next 15 to 20 years. The present output of the station is 24 MW, and it is proposed to raise this to about 100 MW. There are now three 3,000 kW and two 7,500 kW generators, and as a first step another 7,500 kW turbo-alternator and a boiler is to be added by 1953. Two cooling towers are also to be erected. Later a new station is to be built on the site of the present cooling ponds. In this it is planned to install initially one 10,000 kW set and two 100,000 lb/hr boilers, and later a further six 10,000 kW sets with associated boiler plant.

Electrical Steel Production

In association with Guest, Keen and Nettlefolds Ltd., Joseph Sankey and Sons Ltd. have formed an Australian subsidiary with an authorised capital of £250,000 to manufacture electrical sheet steel laminations. A factory is being established at Newcastle, N.S.W., and it is expected that production will begin about June next. Much of the plant will be sent out from the Bankfield works, Bilston, Staffs, and key men are also going out to assist in its erection and operation.

Cable for Brisbane

A recently completed order by Crompton Parkinson, Ltd., for the Brisbane City Council was for 1,000 yd of 0·25 sq in. 3-core 11 kV "H" type submarine cable, to be used for crossing the



Loading one of the drums of cable for Brisbane

Brisbane River. The cable is protected against attacks by termites, especially the teredo. Two layers of galvanised steel armoured wire, compounds, impregnation, and brass tape covering the 2·2 in. l.c. cable, make it 3·5 in. overall. The cable was manufactured in two 500 yd lengths, and our picture shows one of the drums being lowered into the *South Africa Star*. Incidentally, during the past year, more than a third of the p.i. mains cable manufactured at Crompton's Derby works, has been exported.

PERSONALITIES

In the Industry

Two employees of the General Electric Co., Ltd., completed fifty years' service with the company last month. They are **Mr. L. W. Barsdorf,** A.M.I.E.E., A.M.A.I.E.E., technical advisor to the Switchgear and Instrument Department, at Head Office, and **Miss E. Churchill,** of the Invoice Department. Of recent years, Mr. Barsdorf has become noted for his work in lighting apparatus, airfield control and lighting equipment, and electronic instruments and their applications. As a token of appreciation, **Mr. Leslie Gamage,** vice-chairman and joint managing director of the G.E.C., made a presentation recently to both Miss Churchill and Mr. Barsdorf.

We understand that **Mr. Charles Downing** has resigned from the board of British Electric Meters Ltd., and the latter concern has accepted the termination of the agency agreement held by Modern Electric Power Products Ltd., since January, 1940. Mr. Downing is, of course, managing director of the latter concern.

Mr. Charles Downing

His friends in this country will be interested to learn that **Lt.-Col. J. W. Atkins,** M.I.E.E., M.Amer.I.E.E., M.I.E.(Ind.), who joined the Iraq Petroleum Co. in November, 1947, as deputy chief electrical engineer, Pipe Line Division, at Haifa, took over the duties of chief electrical engineer of that division a short time ago. His address now is c/o the Iraq Petroleum Co., P.O. Box No. 150, Tripoli, Lebanon. Lt.-Col. Atkins, it will be remembered, spent some 20 years with the Indian electricity supply industry before going to Haifa.

Now in South Africa, **Mr. J. R. Beard,** C.B.E., M.Sc., M.Inst.C.E., M.I.E.E., senior partner with Merz and McLellan, is planning to visit many of the electricity undertakings in the Union. He expects to return to this country by early March.

At the meeting of the Wakefield Chamber of Trade last week **Mr. H. Goodyear,** principal of the local electrical contracting concern of that name, was elected president for the forthcoming year.

To succeed the late Mr. F. Ridout, the General Electric Co. Ltd. has appointed **Mr. G. L. Butler** as manager of the company's Liverpool branch. Mr. Butler began his career with the company 38 years ago at the Manchester branch, where he has since held various appointments including that of manager of the wire and cable department, and later, the fittings department. He transferred to the Liverpool branch as assistant manager in 1931.

Mr. G. L. Butler

Designers of the display which won the recent annual showroom window display competition run by the North Western Electricity Board, **Miss Gladys Parker,** trainee demonstrator at Burnley service centre, and **Mr. H. Palfrey,** assistant sales superintendent, were presented last week with the Challenge Cup and a replica by Sir Joseph Hallsworth, M.A., chairman of the Board. Our picture

Sir Joseph Hallsworth presents the Challenge Cup to Miss Gladys Parker and Mr. H rey

taken at the presentation includes members of the judging panel. From left to right are shown **Mr. A. O. Johnson** (chief commercial officer); **Mr. J. M. Holmes** (principal, Manchester Municipal School of Art), **Mr. N. H. Bridge** (commercial development officer), **Miss Parker, Mr. Palfrey, Miss N. Kenyon** (member of the Board), **Sir Joseph Hallsworth, Mr. A. R. Fasham** (chairman, Manchester branch, I.A.M.A.), and **Col. J. S. A. Walker** (member of the Board).

Recently appointed to the Board of Marco Refrigerators, Ltd., as director (works and production), **Mr. R. Hewetson** has been with that concern since 1929. Earlier he had gained technical experience at Croydon generating station. With Marco's, he has held various appointments connected with the service, design, development and production of the company's range of automatic refrigerators.

Just returned to this country is **Mr. James F. Magee,** engineer representative in London of the Sydney County Council, Australia. While in Sydney recently he investigated problems of Pyrmont, Bunnerong and Lugarno power stations.

A recent visitor to the Southend factory of E. K. Cole Ltd. was **Mr. S. Moolgaskar,** a director of the great Tata organisation of India, with whom Ekco are associated in the manufacture and distribution of radio products in that country.

Under a plan announced by the Economic Co-operation Administration Mission to the U.K. last week, **Mr. T. F. Hurley,** of the D.I.S.R. Fuel Research Station, Greenwich, is shortly to go to the United States and Canada for a six weeks' study of gas-turbine development. He is expected to arrive in the U.S.A. early in April.

On retiring last week, after nearly 51 years service with W. T. Henley's Telegraph Works Co. Ltd., **Mr. J. W. Lapthorn,** manager of the Order Department, was presented with a television set from his colleagues, Sir Montague Hughman, chairman of the Henley Organisation, performing the ceremony. Mr. Lapthorn is now succeeded by **Mr. E. S. Bantin.** Our photograph above, taken at the ceremony, shows, left to right, **Mr. W. F. Bishop,** C.B.E., **Dr. P. Dunsheath,** C.B.E., **Mr. Lapthorn, Mr. H. M. Jacob, Mr. F. W. M. Anderson, Sir Montague Hughman** and **Mr. W. McClelland,** C.B.E.

Henley's presentation to Mr. J. W. Lapthorn

The South Western Electricity Board has now completed its district organisation by the setting up of five districts in the Cornwall sub-area, replacing the seven temporary sectors. Nominated managers of the new districts are: **Mr. H. R. C. White,** A.M.I.E.E. for West Cornwall, **Mr. J. W. Roberts,** A.M.I.E.E. for Central Cornwall, **Mr. A. H. Warren,** A.M.I.E.E. for North Cornwall, **Mr. J. E. Flower,** A.M.I.E.E. for South Cornwall, and **Mr. J. H. Dent,** A.M.I.E.E. for East Cornwall. Mr. White has been the Board's sub-area engineer since vesting day, having been chief distribution engineer to the Cornwall E.P. Co. previously. Mr. Roberts was manager of one of the temporary districts in Cornwall. He had been with the Cornwall E.P. Co. since 1935. Mr. Warren, too, was with the latter company, latterly as local manager. He was manager of the temporary district based in Newquay. Mr. Flower has been district manager at St. Austell, having served in that capacity with the old St. Austell and District

Mr. J. W. Roberts

Mr. A. H. Warren

Mr. J. E. Flower

Mr. H. R. C. White

Mr. J. H. Dent

E.L. and P. Co. Mr. Dent joined the Cornwall E.P. Co. in 1934 as district manager, after earlier service as engineer and manager of various undertakings, including the Gorseinon Electric Light Co., Ltd. Since vesting day he has acted as manager of one of the Board's temporary districts.

A breezy figure familiar to many in the electrical industry, **Mr. R. W. Kennedy,** who has been editor of the *Electrical Contractor* for the past 24 years, is to retire at the end of this month. As one of the "old dears" we wish him a long and healthy retirement. Mr. Kennedy's successor is **Mr. C. P. Spurr,** who will also be responsible for the publicity of the Electrical Contractors' Assn.

Mr. R. W. Kennedy

Mr. J. F. Ronca will succeed **Dr. D. T. A. Townend** as president of the Institute of Fuel in October next. The Institute's award of the Melchett medal for 1950 has been made to **Prof. R. J. Sarjent,** O.B.E., D.SC., F.INST.F., professor of fuel technology at Sheffield University.

Mr. D. S. Warren has been appointed an additional director of Kalgoorlie Electric Power and Lighting Corpn. Ltd.

On the occasion of the official opening of the Crawley Industrial Estate last week, **Mr. J. Bowthorpe,** chairman and managing director of Bowthorpe Holdings Ltd., was presented to **H.R.H. Princess Elizabeth.**

Mr. G. M. D. Shaw, B.SC. (ENG.), M.I.E.E., district engineer for the Thurrock district of the Eastern Electricity Board (Essex sub-area), has been elected a member of Standing Committee of Convocation of the University of London.

The new president of the Merthyr Chamber of Trade is **Mr. Maldwyn Thomas,** who started the Cardiff firm of electrical contractors of that name some 19 years ago.

Previously with Thorn Electrical Industries Ltd., **Mr. J. V. M. Haydock** has joined Omega Lampworks Ltd., as their representative in Nottinghamshire, Derbyshire and Lincolnshire.

Mrs. Hooper sends her sincere thanks to friends and colleagues of her late husband, Mr. H. Hooper, for their contributions to the I.E.E. Benevolent Fund in lieu of floral tributes.

OBITUARY

The death occurred on January 21 of **Mr. K. Boorn,** aged 80, the oldest employee of Johnson and Phillips, Ltd., with whom he had served for over 62 years. He was foreman of the tape-dipping and impregnating shop for over 47 years.

We regret to record the death last week of **Sir John Aiton,** C.B.E., governing director of Aiton and Co., Ltd., and a director of other concerns.

There will be deep regret throughout the industry at the news of the death on January 29, of **Colonel Sir Thomas Purves,** O.B.E., M.I.E.E., aged 78, who had been an eminent electrical personality for very many years. He was director of the Cable Makers Association from 1936 until 1948, but he had earlier become a prominent figure at electrical gatherings. Most of his career was spent in the G.P.O. with which he served as engineer-in-chief from 1922 to 1932. A Berwickshire man, after joining the G.P.O. he studied science at Edinburgh University and at the Heriot-Watt College—he won that college's first medal for electrical and technical telegraphy. Thereby he was selected for transfer to the Engineering Department of the G.P.O., and proceeded to climb the ladder. By 1907 he had become staff engineer in charge of the Design Dept., and following war service, was appointed assistant engineer-in-chief in 1919, succeeding Sir William Noble to the major position three years later. The cheery presence of Sir Thomas will be deeply missed at many future electrical functions. A memorial service is to be held at Savoy Chapel on February 15. Time to be announced later.

Col. Sir Thomas Purves

We regret to record the death, on January 22, of **Mr. A. Steele,** aged 66, manager of the Glasgow branch of Siemens Electric Lamps and Supplies, Ltd. He joined Siemens Brothers Dynamo Works Ltd., in 1911, as assistant in the supply section at Glasgow, and three years later became manager of that department. In 1920 when the present company was formed he was appointed manager of the Glasgow branch, continuing in that position till just before last Christmas, when he was taken ill.

Mr. A. Steele

WILLS—Mr. H. Livsey, late managing director of E. Green and Son, Ltd., left £22,274 (£22,132 net value).

Col. A. P. Pyne, M.I.E.E., R.A. (T.), retd., at one time chief electrical and works engineer of Palmers Shipbuilding Co., and subsequently with Johnson and Phillips, and Ismay Cables Ltd., left £2,346 (£2,310 net value).

Mr. T. W. Morgan, M.B.E., works manager of Marconi's Wireless Telegraph Co., Ltd., left £4,169 (£4,029 net value).

SURGE DIVERTERS

Design and Construction Described at I.E.E.

A PROBLEM which has confronted the electrical engineer from the beginning of electrotechnology is the protection of equipment against the effects of lightning. To this end much work has been done on diverters, non-linear resistors, and spark gaps. Present developments in these devices were described last Wednesday at the Institution of Electrical Engineers by H. F. JONES and C. J. O. GARRARD in their paper, "The Design, Specification and Performance of High-Voltage Surge Diverters."

The Problem

The details of the problem were not well defined and depended on many variables. However, in general the initial voltage of the surge produced either by a direct or indirect stroke on a transmission line was limited by the insulation level of the conductors. The consequent surge for a direct stroke was known to vary over the range 1½/2½ microsec. to 10/50 microsec., and surge currents could have a rate of change of 40 kA/microsec. A mean value was probably about 5 kA/microsec. The energy content of the stroke was also in doubt, estimates varying from 4 kWh to 5,000 kWh.

Further points that had to be taken into consideration when dealing with surge diversion were the potentials to earth existing on lines under various load conditions and under fault conditions, and also the means by which the neutral was earthed.

Finally the question of economics had to be taken into account, and this was largely bound up with the likelihood of severe storms occurring locally and the potential damage which would be avoided by the fitting of diverters.

Diverter Design

The most effective diverter was the non-linear resistor type which was of comparatively recent origin. In its simplest form it consisted of a single gap and a non-linear resistor consisting of a single carborundum disc. As the voltage increased it became necessary to use a number of discs and gaps in series. Up to 33 kV it was practicable to accommodate these in a single housing, but for higher voltages the housing itself must be sub-divided into a number of units. The housing was usually of porcelain with hermetically sealed caps. Several types of spark-gap were used. It was most important that no water should be allowed to enter the diverter housing.

The resistors were made conveniently in the form of circular discs and it was found that the greatest discharge capacity was obtained if the thickness of the discs was about 1-1½ in. The diameter, however, might vary from 2 in. for a disc capable of discharging, say, 10,000 amps to 6 in. for one capable of discharging 100,000 amps.

It was generally advisable to grade the diverter when there were a number of units in series. This could be done either by fitting grading rings to the upper end of the stack, by using resistors, or by utilising a semi-conducting glaze on the porcelains.

Standard Specification

The authors suggested that a Standard Specification should be introduced and put forward various proposals which might act as a basis for such a Specification. The principal objects were to classify diverters into three groups, "rural" (up to 22 kV), "line" (up to 66 kV), and "station" (for equipment protection at stations). Suggested ratings were given, and a series of type tests for spark gaps and non-linear resistors proposed. Recommendations were also given for installation practice and routine maintenance.

The paper concluded by giving details of a simple type of surge counter suitable for assessing the efficiency of surge diverters. Basically it consisted of three components in parallel; a non linear resistor, a condenser, and a telephone subscribers counter. These were put in series with the earth terminal of the diverter. Full details of the values of the components and the method of computation are included to show the method of operation.

DISCUSSION

MR. F. R. PERRY (M.-V.) suggested several reasons for the delay in surge diverter development in this country. The lightning problem in England was not so severe as in many other countries and this resulted in a general scepticism about the value of surge diverters. Some designs were probably marketed prematurely and their behaviour in the field was not altogether satisfactory. Finally, there was nothing to indicate whether a surge diverter was doing its job; there might be no breakdowns, but there might also be no surges. Some form of surge counter would afford proof that there were surges on the system with which the diverter was dealing.

DR. J. S. FORREST (B.E.A. Research Laboratories) characterised the work described as a good example of co-operation between the manufacturing and supply sides of the industry.

The scheme proposed by the Authors for the protection of machines where severe storms were prevalent involved putting diverters 2,500 ft from the station, with additional diverters at 500 ft from the station. In addition, there were overhead earth wires, condensers at the machine terminals with

another set of diverters across them, series inductors at the machine terminals, and a diverter at the neutral point. This, he said, was altogether too much of a good thing, and presupposed a very high degree of reliability for the surge diverters themselves. It would be a good thing if large numbers of surge counters could be installed, particularly in lower voltage installations, but their cost represented an appreciable fraction of the cost of the arresters. An inexpensive counter would help considerably.

MR. R. MALLET (Midlands El. Bd.) said that the varieties of tests and specifications which manufacturers gave at present were most confusing, and all engineers concerned with the installation of surge diverters would welcome the standards suggested by the Authors, which corresponded closely to American proposals. The Authors' rural type arresters were presumably meant for localities where an expensive arrester would not be justified, but with small arresters the cost of installation was probably equal to the cost of the arrester, so that even a reduction of 50% in the arrester cost would not give a very appreciable saving, and if it reduced the reliability or efficiency of the arrester considerably, it would not pay in the long run. However cheaply surge diverters were made, in this country there would be no justification for installing them on transformers in rural districts as less than 0·2% of the total transformers on overhead lines were damaged in this country last year.

MR. W. HILL (Midlands El. Bd.) emphasised that the arc suppression coil was not an answer to lightning troubles, because it could deal with only one phase at a time. The rural diverter could be justified if it was cheap, but they could not afford to put in diverters at every transformer.

MR. R. LANGLOIS-BERTHELOT (Electricité de France), in an interesting review of the position in France, mentioned that the price of arresters still varied by as much as 40% between manufacturers in the same country, and the difference was even greater between manufacturers in different countries. There were also differences between standards and between test rules. On the question of how many discharge currents there should be for each voltage, the manufacturer wanted a small variety of types, to reduce the price and make possible manufacture in large batches. The price of the 5,000-amp type was two-thirds of that of the 10,000-amp, so that there was justification for retaining those two types, but the price of the 3,000-amp type was only 10% less than that of the 5,000-amp, so that it was not justified.

MR. K. DANNENBERG (E.M.P. Electric) agreed with the need for a British standard for surge diverters. The Authors, he said, adopted as a basis for tests surge current waves having a shape of 10/20 microsecs, but a test on this basis might not cover all conditions. The application of surge diverters up to 33 kV was important, but the frequency of direct strokes to these lines was small, and indirect surges would have a wave shape with a much longer tail than 20 microsecs. He would like to see a test with a second current wave based on a 10/50 wave shape.

MR. J. S. CLIFF (G.E.C.) said the Authors confined their economic justification of surge diverters to the savings due to the reduction of damage to other apparatus, mainly transformers. This modest claim could be substantiated in this country for systems of 66 kV and under, but not for 132 kV. An important economic factor in favour of the surge diverter for 132 kV and over, however, was the reduction made possible in the cost of transformers. The higher the voltage and the larger the MVA rating of the transformer the greater the economic saving, not only in the amount of insulation used but also in the consequential reduction in size, weight, impedence and losses. On large transformers the saving in cost might be 20-25%, compared with the additional cost of the surge diverter of 2-3%.

The development of efficient high voltage surge diverters was, therefore, of great importance to British transformer manufacturers if they were to compete in the export market for schemes in areas subject to lightning.

MR. A. J. HASELFOOT (A.S.E.A. Electric) pointed out that surge diverters and arc suppression coils were not alternatives. The function of the suppression coil was to prevent line outages due to single-phase flashovers, while the surge diverter had to protect the station from the effect of voltage surges of sufficient magnitude to damage it.

MR. T. F. MONAHAN (M.-V.) remarked that American manufacturers were often regarded as ahead of British in regard to surge diverters but Fig. 11 of the paper showed performance which was somewhat better than the American figures. This seemed to be due to a follow current which was larger than the usual practice, and he wondered how the difficulties which this introduced in the design of gaps had been overcome.

DR. R. H. GOLDE (E.R.A.) supported the Authors' plea for specifications for lightning arresters, but suggested that it was first necessary to consider the sort of stress to which they might be subjected.

MR. H. L. F. LINTON (Min. of F. and P.) said that the trend in rural districts was towards unearthed wood pole construction, where flashover could hardly occur across line insulators and one would expect damage to unprotected transformers. In practice, however, the number of transformers damaged in this country on rural systems was very small; in 1949 only three were damaged.

DR. F. J. MIRANDA said the Authors preferred the term "surge diverter" to the more commonly used "lightning arrester." Such a change would be justifiable if the former name better described the function of the apparatus, but that was not the case, and the fact that production in this country was mainly for overseas markets was a further reason for retaining the established term.

The Authors briefly replied.

PACKAGING PLASTICS

Direct Applications to Electrical Engineering

PLASTICS produced by British Celanese Ltd. are most readily associated with fashionable packaging techniques, especially "vision packaging," the protection of the sales article by a thin, transparent film that allows the customer to see his purchase. It is less widely realised that Celanese plastics, both in this film form and also when extruded as a rod or tube, have many direct engineering applications in the field of electrical apparatus.

Both the film (trade name 'Clarifoil') and the sheet, tube and rod ('Celastoid') have a cellulose acetate base, and in thin sections burn slowly. When the tube is used as a covering over metal inserts, 'Celastoid' meets the L.C.C. regulations. Average properties are listed in the table, and these must be considered in combination with the ready machineability of 'Celastoid', which greatly enhances its usefulness.

Plastic Conduit

Extruded as a tube, 'Celastoid' has already found an electrical application in aircraft installations, where it has been used as a conduit for wires and cables, and also in some automatic telephone relay assemblies, where units are placed very close together, and the 'Celastoid' acts as a dust-excluding channel for wiring. In these particular uses the availability of the tubing in some thirty different colours makes it specially useful in helping identification where complicated cable runs are necessary. For ordinary power wiring purposes the use of the plastic tube may not be justified on a cost basis —but there are situations where its decorative possibilities make it an attractive alternative to more conventional materials.

A likely instance is the common occurrence, when an extension to a wiring system has been carried out in t.r.s. or lead-covered cable, surface wiring. Too often the resulting projection from wall or ceiling is unsightly, and out of keeping with the general decoration of the room. In such a case, 'Celastoid' can come to the rescue. Readily extrudable, it can be produced in a form similar to the old wood capping and casing mouldings—but unlike wood, not requiring an expert craftsman for its fitting. Moreover, such an extrusion is readily obtainable in a matching colour, if black or white prove unsuitable.

Another possible use in the domestic electrification field utilises the plastic formed as a coiled rope, which is quite flexible. So arranged, it has found application as an anti-kinking fixture on the flexibles of irons, telephones, etc.

So far, 'Celastoid' has been considered, but as stated in the introduction, 'Clarifoil' also has applications. This material is available in films down to 0·001 in. (±5%) thick, and in addition to its transparency, has the advantage of presenting a very smooth surface. For these reasons it has been found very useful as an interlayer insulant and separator in some coils wound with fine gauge wire.

PROPERTIES OF "CELANESE" PLASTICS

Property	'Celastoid'	'Clarifoil'
Volume Resistivity	$1{\cdot}37 \times 10^{13}$ MΩ/cm cube (92% R.H., 25° C)	10^{12}—10^{14} MΩ/cm cube
Dielectric strength	500 V/mil	3 kV/mil
Surface Resistivity at 20° C ...	$2{\cdot}15 \times 10^{12}$ MΩ /sq cm	—
Softening point ...	60° C to 80° C	130° C to 170° C
Tensile strength (65% R.H., 20° C)	4,300-7,000 lb/sq in.	—
Burning rate ...	Slow burning to self-extinguishing	—

Heavy Engineering

Possibilities in the heavier branches of electrical engineering are found when the film is attached by adhesive to a thin metal or card base, giving a laminated structure. One form that springs readily to mind is the insulating of one side of aluminium foil, but a more interesting example, which has found practical application in the United States, is a laminated slot lining board for use with electrical machinery. A thin cardboard is coated on each side with a layer of 'Clarifoil,' which both increases its insulating properties and gives it the smooth surface necessary for this kind of work. The resulting laminate is in one case about half a millimetre thick, and very flexible. Sharp bends can be made without damage to either surface.

BLIND LANDING

ELECTRICAL aids to the safe landing of aircraft were discussed by MR. T. E. SCHILIZZI, B.A., Graduate I.E.E., in a paper which he presented yesterday to the I.E.E., London Students' section. "The Instrument Landing System," using operating frequencies in the v.h.f. band, and "Ground Controlled Approach," which works with 10 cm and 3 cm radar operated from the ground, were the principal systems covered.

The techniques involved in these two systems were described, and their use in relation to aircraft traffic control at large aerodromes dealt with at some length. The two systems were compared on the basis of safety, traffic flow, reliability, the human factors involved and cost, and they were found to be complementary in several important respects.

CANADIAN POWER

THE Department of Mines and Resources in Canada has recently issued a comprehensive review of the Canadian power situation. During 1949 the post-war boom in hydro-electric construction continued without abatement, and although no new large plants were brought into operation, an appreciable increase in capacity was made available by extensions to existing stations.

Installed capacity in Canada now totals 11,622,668 h.p., including 272,050 h.p. located in the new province of Newfoundland. The increase in the year was 479,900 h.p. which is slightly greater than that attained in 1948, and is well in advance of the pre-war yearly rate of expansion of about 300,000 h.p. Developments in an advanced stage of construction, however, will add about 1,500,000 h.p. within the next two years; and other developments of considerable magnitude are in preliminary stages of construction or are definitely planned. Long range investigations envisage the development of other sites some of which are of large capacity.

Distribution

In the field of power distribution, construction similarly was very active. New main transmission lines were completed or were under construction in most sections of the country. Many new transformer stations and substations were built and secondary lines were extended. Rural electrification was particularly active in Quebec, Ontario, and Manitoba.

During the year the demand for hydro-electric energy continued to expand throughout the country as a result of a high level of industrial activity in conjunction with increased commercial, domestic and rural consumption. The increased overall demand is reflected in the consumption of primary power which, according to the records of the Dominion Bureau of Statistics for the first ten months of 1949, increased 3·1% over that for the same period of 1948, the previously high year, and 12·9% over 1947. However, despite the additions to generating capacity which were made in 1948 and 1949, total production of central electric stations in 1949 was only 2·8% greater than that of 1947. Generally speaking, stream flow conditions were unfavourable for a considerable part of the year and, at times, some of the large hydro-electric systems had difficulty in meeting all power demands. The completion of a number of the larger plants which are now under construction will be necessary before essential reserve capacity becomes available.

Fuel and Power Research

RESEARCH projects which are being developed by the chief scientist's division of the Ministry of Fuel and Power were discussed at a London press conference last week, when the Minister himself, Mr. Hugh Gaitskell, and his chief scientist, Dr. H. Roxbee Cox, reported on progress in such diverse investigations as underground coal gasification, heat pumps, gas turbines and the utilisation of wind power.

Probably the work with most interest for the electrical industry is that on solid fuel burning gas turbines, in which several large electrical manufacturing firms are involved. English Electric are making a 2,000 h.p. machine operating on the internal combustion of pulverised coal, while C. A. Parsons Ltd. are using a 500 h.p. gas turbine to investigate some basic problems of the internal combustion of coal. John Brown's are developing a closed cycle external combustion set.

Two-stage internal combustion, with producer gas as the intermediate substance, is being investigated by three firms, of whom Metropolitan-Vickers Ltd. are developing the gas turbine and Joseph Lucas are co-operating with another Birmingham firm, Incandescent Heat Ltd., in designing the producer unit.

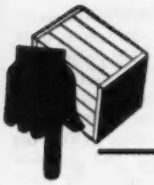
Gas turbines to burn peat are the particular interest of the North of Scotland H.E. Board. For them a closed cycle machine is being built by John Brown, while the Ministry of Fuel are organising work on an open cycle system, Ruston and Hornsby being the engineering firm involved in this project.

Power from Firedamp

An interesting development being actively pursued is the use in gas turbines of the firedamp which occurs in the upcasts from mines. Preliminary work has shown that this will, with preheating, be a suitable fuel, and the possibility of a machine working on this fuel and on coal fines is being worked out.

The underground gasification of coal experiment begun in November near Nottingham is still in the "investigation of drilling problems" stage. Another interesting development, the heat pump, is due for a large scale test in the L.C.C. concert hall, where an installation will be powered from modified Rolls-Royce engines running on town's gas.

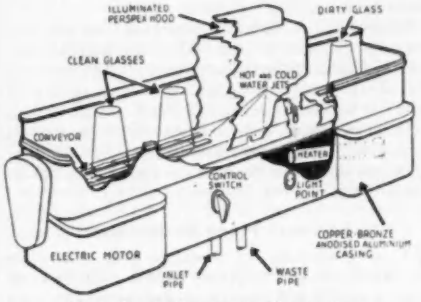
Important in conserving fuel by making the best use of the power produced from it are the results made available by the Ministry's mobile testing unit, which visits factories and in two to three weeks takes such readings as are necessary to produce a thermal balance sheet for that concern.



THE BUYER'S COLUMN

The "Glassmaster" by Hoover

A HANDSOME new electrically-operated fitting which should be fitted in every bar or counter is the "Glassmaster," just produced by Hoover Ltd., of Perivale, Greenford, Middx. A self-contained unit compactly built, the "Glassmaster" supplies a constant stream of perfectly clean glasses. All types and sizes can be washed at the same time, glass or metal tankards, lager glasses and tiny liqueur glasses. The glasses are placed on the receiving tray and the machine does the rest. A built-in conveyor carries the glasses



How the "Glassmaster" operates

through a series of powerful jets which rinse them inside and out first in hot and then in cold water. The "Glassmaster" is operated by a Hoover f.h.p. motor. Its total rating is 2½ kW and it has a capacity of 1,500 glasses per hour. Price £50 complete.

Housewife's Dream

IN the domestic drudgery championships, washing-up has always been the favourite, but it now has been ousted from its leading position. The "Auto-Sink" has now arrived on the scene to put an end to the drudgery of this chore. A gleaming stainless steel unit takes the place of the kitchen sink, providing for automatic dish-washing even in the smallest home. The washing unit comprises a system of revolving nylon brushes with a special roller bracket which permits crockery and saucepans, etc., to be brushed under water. The "Auto-Sink," built by Staines Kitchen Equipment Co. Ltd., of 94 Victoria Street, London S.W.1, has been on show at the Hotel Exhibition at Olympia. Operation of the unit is by a Crompton Parkinson f.h.p. motor coupled to an ingenious gearbox. All mechanism is enclosed and can be operated with safety even by a child.

Refrigerators' Guarantees Extended

INFORMATION received from three well-known refrigerator manufacturers shows that for the three firms the guarantee on five of their models is increased from one to five years as from February 1, 1950. G.E.C. announce that this extended guarantee covers their model DMH.51 which is reduced in price at the same time from £95 plus p.t. £24 14s. to £85 plus p.t. £22 2s. Hotpoint now guarantee for five years their H.10 and H.20 models which are increased in price to £52 10s. plus p.t. £13 13s. and £72 10s. plus p.t. £18 17s. respectively. The third firm, International Refrigerator Co., makers of "Coldrator" refrigerators, also announce the five years coverage for the C.D.3 and C.D.5 models; these prices have also been increased to £52 10s. plus p.t. £13 13s. and £72 10s. plus p.t. £18 17s.

Electric Clock Controls Appliances

ONE farthing a day, that's all that has to be paid for the services of the latest maid-of-all-work. The Sectric Pre-set clock, produced by Smiths English Clocks, Ltd., Sectric House, Waterloo Road, London N.W.2, has been designed for many useful functions. It can be connected to any known make of radio receiver and will switch on and off at predetermined times. Similarly, you can operate your bedside lamp, electric blanket, your kettle or any other household appliance in this manner. Most important to the housewife is that the clock can control the operation of an electric cooker so that the busy woman can carry on with her other duties without worry.

Burglar alarms are, we are sorry to say, becoming more necessary these days, and here again the "Maid" takes over. Whilst away for the weekend

The attractive maid-of-all-work by Sectric

the clock will automatically switch on the lights for any period from ten minutes to several hours, thus acting as an effective deterrent to the potential felon. Price of the "pre-set" clock supplied in highly polished walnut case is £6 2s., including purchase tax.

"Gland Service"

CRANE Packing Ltd., of Slough, Bucks, specialists in gland packings, have now issued a recommendation chart of Gland service. It includes a list of fluids and tables in which is indicated the particular gland packing suitable for use with those fluids. The brochure also incorporates a note on how to fit packings correctly.

The firm has also produced a number of new style leaflets dealing with their well-known products, amongst them "Superseal," a fluid plastic, "Wilkie" condenser fittings, and "Standard" and "Compact" mechanical seals.

Purchase Tax on Table Fountains

STOKES APPLIANCES LTD., of 16 Dingwall Road, Croydon, Surrey, inform us that as from January 16, purchase tax of £3 10s. is chargeable on all table model fountains. The fountain unit will be tax-free when sold separately.

Doughnuts en masse

RECENTLY introduced by the Arora Co., of Loughborough, Leicester, the Arora Electric doughnut cooker has been developed from their redesigned fish and chip fryer.

It is a self-contained unit for the use of small bakers, the draining trays being arranged to fold away and act as covers. The splash back is removable and provision is made for storing at the back. Castors are provided if required. Loading is 6 kW with three-heat control on "Arora" heavy duty cooking bars. Finished in sprayed aluminium with stove black hob and tray frame, the cooker is priced £55 5s. nett.

Self-contained doughnut cooker by Arora

A new Automatic Toaster

NEW addition to the range of heavy duty automatic toasters is the "Crypto-matic" made by Crypto Ltd., North Circular Road, London N.W.10. Designed to combine simplicity in operation with robust construction, the toaster is available in three models: two-slice (120 slices per hour), four-slice (240 p.h.) and six-slice (360 p.h.). The toaster is for operation from either a.c. single-phase or d.c. supply on standard voltage ranges 200/220 V or 230/250 V. Approximate loadings are 1·4 kW, 2·8 kW and 3·9 kW for the three sizes respectively. Precision timing control with a wide range of settings covers all requirements. The automatic time switch mechanism breaks the circuit and releases the toast carriers which then "pop up," for withdrawing toast

British Made Glass Burnishers

OUR attention has been drawn to the reintroduction to their range of products, by the Synthetic Carbon and Engineering Co. Ltd., Cumberland Road, Stanmore, Middlesex, of glass burnishing brushes.

These brushes, formerly imported from abroad, are now made in Britain. They are excellent for cleaning commutators and slip rings, for cleaning the contacts in switchgear and for a variety of other uses. We found that a clean surface is very rapidly attained with the minimum of effort. Available as a standard line in sizes ¼ in. to 2 in. diameter and 4 in. to 6 in. in length, the prices range from 5s. to 9s. each.

Ferranti Price Reductions

IT is announced by Ferranti Ltd. that price reductions on current models of Ferranti electric clocks will operate as and from February 1, 1950, and that rebate will be given on certified stock claims which are received by February 28, 1950. Full details can be obtained from Ferranti Ltd., Moston, Manchester 10.

TRADE PUBLICATIONS

EXTRUDED ALUMINIUM.—Extrusion processes, as applied to aluminium and its alloys, are reviewed in information bulletin No. 16 of the Aluminium Development Association, 33 Grosvenor Street, London W.1. Problems that can profitably be discussed between producer and designer at an early stage are illustrated, and the advantages of the process brought out.

"*Torque*" referred to as a "new twist on engineering rubber" is the development journal of Silentbloc Ltd. and the Andre Rubber Co. January issue has many interesting notes on vibration, the battle against it, and the uses of rubber mountings in the fight.

RADIO FREQUENCY CABLES. Leaflet No. 3 dealing with Telcon cables for car radio, anti-static and television aerials, and microphone cables has now been issued by Telegraph Construction and Maintenance Co. Ltd., Telcon Works, Greenwich, S.E.10. It presents in tabular form cable characteristics and nominal dimensions.

THE WEEK IN NEWS

B.E.P. Conference Programme

THE provisional programme of the second British Electrical Power Convention, to be held at Harrogate from June 19 to 23, just issued, shows that the early formal stages have been streamlined, compared with last year's event. Thus the issue of badges from 10 a.m , opening of the Electrical Exhibition at Sun Pavilion, 2.30 p.m., and reception by the Mayor, 8.15 p.m., all take place on Monday, June 19. The first session of the Convention will then commence at 10.15 a.m. on June 20, with Sir Vincent Z. de Ferranti, M.C., M.I.E.E., giving his presidential address. The Harrogate Rotary Club lunch is at 1 p.m., followed by the second session of the Convention at 2.30 p.m., when Sir Henry Self will present a paper. The ladies' tea follows at 4.30 p.m., and reception by the president at 8.15 p.m. Wednesday morning is devoted to a paper presented by E.L.M.A., with coach tours arranged for the afternoon. The joint paper by B.E.A., B.E.A.M.A., and the Watertube Boilermakers' Association will be given at 10 a.m. on Thursday, and continued after the E.A.W. lunch (12.45 p.m.), the annual dinner at the Majestic Hotel at 7 p.m., completing the day. Friday is to be devoted to the general meeting, commencing at 10.30 a.m.

I.E.S. Summer Meeting in May

LIGHTING engineers envisaging floodlighting on a large scale at the 1951 Festival of Britain, will find great interest in Mr. R. O. Ackerley's paper, "Floodlighting," to be read at the I.E.S. summer meeting. The conference will be held in Buxton from May 16-19.

Among the other papers, "Lighting of Fibre and Fabric," by H. Hewitt, will appeal to representatives of textile industries; an up-to-date account of stage lighting practice will be given in "Stage Lighting in the Post-War Theatre in Great Britain," by L. G. Applebee, and J. M. Waldram will survey contemporary practice in "Street Lighting."

In addition to the technical papers two addresses are to be given. Dr. L. A. Sayce of N.P.L. will talk about "Visual Deception," and Mr. Ivar Folcker, chairman, National Illumination Committee of Sweden, and president of the Swedish I.E.S., will outline Swedish lighting during the last ten years. Full details of the summer meeting are obtainable from the secretary, I.E.S., 32 Victoria Street, S.W.1.

Commercial Travellers' Schools

A RECORD response to the appeal for the support of the Royal Commercial Travellers' Schools was announced at the festival dinner last week; it had been surpassed only by the special centenary appeal. This year Mr. Leslie Gamage was president, and his personal list amounted to £9,447 which, with lists of the vice-presidents and stewards of the G.E.C., totalled £14,108. The sums contributed by the Electrical Commercial Travellers' Association were £1,016, and in all the appeal list reached £38,411, which the Hon. Mrs. Leslie Gamage made up to £39,000.

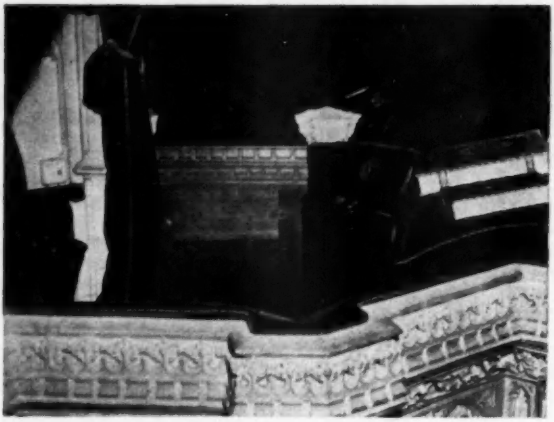
Following the dinner, Air Chief Marshal Sir Philip Joubert proposed the toast of the Schools in witty style, and Mr. J. F. Dunn replied. To Mr. T. S. Sara's toast of the "Appeal President," Mr. Leslie Gamage thanked his supporters. Mr. T. W. Heather responded to the toast of the vice-presidents, stewards and helpers of the appeal. The speeches were followed by a programme of entertainment. In the information provided for guests, it was stated that the schools now have 238 pupils of which 11 are electrical.

Survey of Wage Incentives

WAGE incentive payments are to be investigated by a committee being set up by the National Joint Advisory Council. Composed of three representatives of the British Employers' Confederation, three from T.U.C. and one from the nationalised industries, the inquiry will enable a revised chapter on incentives to be added to the M.o.L. Industrial Relations handbooks.

The First Half Century

There is nothing more amusing than a technical case in a court of justice; everything seems topsy-turvy, the witnesses bully the counsel instead of vice versa, and all combine to lay down the law to the judge. The present case abounds in happy epigrams; Mr. Swinburne's answer, "There is no state of knowledge, there was a very general state of ignorance," will not soon be forgotten. Equally happy was Mr. Ferranti with his apophthegm, "Nothing can be done without thought, nothing can be put into practice without experiment." Mr. Fletcher Moulton's graphic description of the high tension gnashing its teeth in its cage, and of a transformer straddling the mains, are worthy of illustration by our Dumb Crambo friend, and there was a charming mixture of dimensions in the volt, part of which were used up as heat and part did work and appeared as current in the secondary—a description assented to by Mr. Ferranti as perfectly accurate. Lord Kelvin is always an unmanageable witness, and the attempts of Mr. Bousfield to make him say something he did not intend to say were very satisfying to the sense of humour of the highly critical audience.—*From our issue of February 1, 1900.*



Plush cushioning of the Archbishop's Throne in Canterbury Cathedral now incorporates a specially designed microphone

have just installed in Canterbury Cathedral. Loudspeakers likely to cause acoustic "feedback" are automatically muted when an adjacent microphone is brought into use. No attention is required to the controls during the service. Individually designed loudspeakers harmonise with the patina of the stonework, and the Archbishop's microphone has been cleverly concealed in the plush cushioning which surrounds the throne. Microphones for the high altar and nave altar are mounted in specially designed black marble cases.

Altogether there are 17 microphones in different positions in the cathedral. Over 100 loudspeakers have been placed at varying levels to overcome the 8½ second reverberation period due to the hard stone walls and lofty roof spaces.

New Zealand tells its Story

NEW ZEALAND has good reason to bless its generous water resources. That such power potential is being actively developed is the story told in a new booklet issued by the State Hydro-Electric Department, a copy of which we have just received. Entitled "Hydro Electric Power," this booklet is profusely illustrated with views of the various power generation schemes completed or under construction, and includes diagrams of the generation and distribution systems. A second booklet, with the title "Men and Machines," issued by the Ministry of Works, tells how resources have been developed to bring further prosperity and high living standards. This booklet, too, has many illustrations, mainly of civil construction work.

Cathedral Acoustic "Feedback" Eliminated

AN ingenious system of volume regulation is incorporated in the automatic sound reproduction equipment which Philips Electrical Ltd.

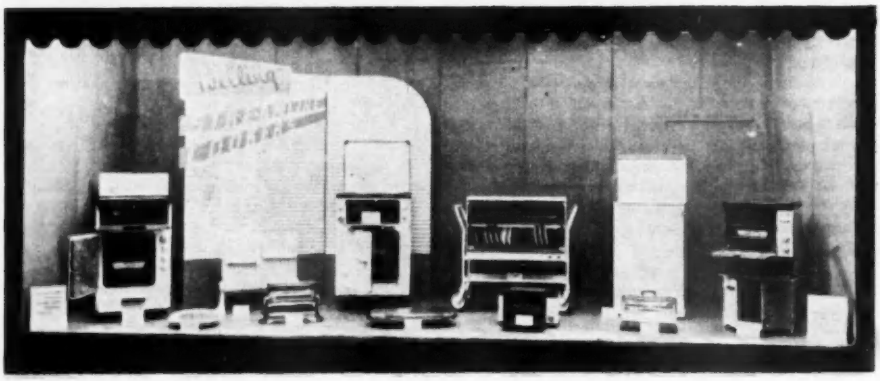
B.E.A. Provide Stand-by for Control Centre

SHOULD grid supply fail at St. Paul's control centre of B.E.A., a 55 kW McLaren/Brush emergency generating set can be immediately brought into operation. The set will provide sufficient power to light the centre and operate all the station's ancillary services. So that immediate starting could be ensured, a Caldwell 1 kW heater, controlled by a Teddington thermostat (range 100-200° F.), has been fitted. St. Paul's centre directly controls three generating divisions, and if necessary electricity supplies all over the country can be regulated.

Traders admit Eastern Board

DISS Chamber of Trade decided at its annual meeting to admit Eastern Board as a member. A long discussion had taken place at a previous

To supplement cookery demonstrations in various Area Board showrooms, Belling and Co., Ltd. arranged special window displays. Photo shows a showroom window at The Headrow, Leeds



meeting on whether nationalised concerns should be admitted.

Mr. W. D. Chitty, president, said some felt the Board's method of trading—especially as regards hire purchase at a small rate of interest—was unfair. Personally he would rather have the Board inside than outside. If they were inside the Chamber could at least talk to them.

Twin 40-watt "Atlas" fittings with quickstart control light one of the Jax stores in Oxford Street, W.1

Mr. H. F. Wren, vice-president, said the Board's officials had explained that prior to nationalisation cookers were hired out for a small sum but remained the property of the undertaking. Now, for a little extra charge, the cooker was bought after five years. He did not think that was unfair trading. The motion was carried.

Tower Testing

RESULTS obtained with a plant erected for the testing of transmission towers are critically examined in a paper entitled "Tests of Transmission Line Towers" which Mr. H. W. B. Gardiner, B.Sc. (Eng.), M.I.E.E., M.I.Mech.E., and Mr. W. H. Gomm, B.Sc. (Eng.), A.M.I.Mech.E., read before the Institution of Structural Engineers last Thursday. Some interesting comparisons are made with the predictions of various standard formulae for the buckling and collapse of struts and columns.

Exam. for Sales Assistants

FURTHER to our note in last week's issue, we are informed by the E.A.W. Training and Diploma Committee that many people already in the industry and in the electrical departments of the large stores will have the necessary knowledge to sit the examination at the end of November, 1950. Where short refresher courses are needed, it is hoped that these will be arranged by the industry. Some domestic science training colleges and technical colleges will first have to introduce the required course into their curriculum, and possibly these candidates will not be ready for the examination this year.

Standardisation Proposed

FIVE great companies in the process industry field have formed an Association to effect standardisation of engineering materials and equipment which they use in common. With Anglo-Iranian Oil, Courtaulds, I.C.I., Lever Bros. and Unilever, and Shell Petroleum as sponsors, the Engineering Equipment Users' Association will work with the British Standards Institution on matters of general standardisation.

When experience has been gained, arrangements are to be made for other interested firms to take part in consultations. Brigadier L. F. S. Dawes, late Royal Engineers, has been appointed secretary, and the offices are at 20 Grosvenor Gardens, S.W.1.

New Third Programme Transmitter

TEN times more powerful than the original Liverpool Station, and with a more efficient aerial, a new B.B.C. Third Programme transmitter was opened last week in Mersey Road, Birkenhead. The previous station in Dryden Road, which has operated since 1940, has now closed down. At the present time there is only a 1 kW transmitter at Mersey Road, but another is to be built as reserve. Both will be remotely controlled over telephone lines from Broadcasting House, Manchester.

Blueprint for Miners' Technical Education

"THE Ladder Plan"—a scheme to raise standards of technical education of tradesmen in the coal industry—was announced by N.C.B. yesterday. Proposed qualifying examinations for tradesmen and under-officials include a general certificate taken after a three-year part-time course, and an ordinary national certificate intended as preliminary to a higher national certificate. Oral and practical tests are proposed as an alternative to the written examination for deputies.

If the proposals are approved a national advisory committee on mining certificates will be established to suggest minimum standards of courses and training. It is hoped to relate the proposed mining certificates to the ordinary and higher certificates held under the aegis of I.Mech.E. and I.E.E.

Television and the Batti-Wallahs

MR. T. C. MACNAMARA, head of the Planning and Installation Department of the B.B.C., was guest of honour at the January luncheon of the Batti-Wallahs' Society, on Thursday.

Addressing members and their guests, he traced the evolution of television in this country from the original Baird 30-line system to the present day, and gave one or two forecasts on its future.

Leading the world in television in the late 1930's

Britain had been badly handicapped by the complete cessation of development during the war years. Lack of studio space was a handicap, but it was hoped that the first of the new studios at Lime Grove would be in operation this spring.

Television development would always be conditioned by considerations of receiver cost—it was no use embarking on any improvement which was likely to increase the cost of the domestic receiver. Brief reference was made to colour television developments and to the new techniques of television recording on film.

Science and Technology in 1951

FURTHER information about the part science and technology is to play in the 1951 Festival of Britain was given by Sir Edward Appleton, G.B.E., K.C.B., F.R.S., at a press conference on Thursday. He mentioned signs of heightened public consciousness of the importance of engineering and scientific progress, and concluded that in 1951 the time would be ripe for a public statement "of the diversity and moment of such progress."

Three exhibitions are involved in the 1951 Festival: the South Bank Exhibition, the Science Exhibition at South Kensington, and the Exhibition of Industrial Power in the Kelvin Hall, Glasgow.

On the South Bank, the accent has been placed on the way science has influenced civilisation. At South Kensington the limited topic chosen is the growth of our understanding of the nature and architecture of matter. Throughout this essentially scientific exhibition there are references to the surprising way in which technological advances have followed developments of man's insight into atomic and nuclear structures.

Two main stories are presented in Glasgow, those of coal and water power in Great Britain. In addition, the applications of nuclear power will be dealt with. Backing up all these efforts it is hoped that learned societies and scientific institutions will make 1951 a special occasion for the display and assessment of British achievement in their own chosen field.

Display Lighting Times

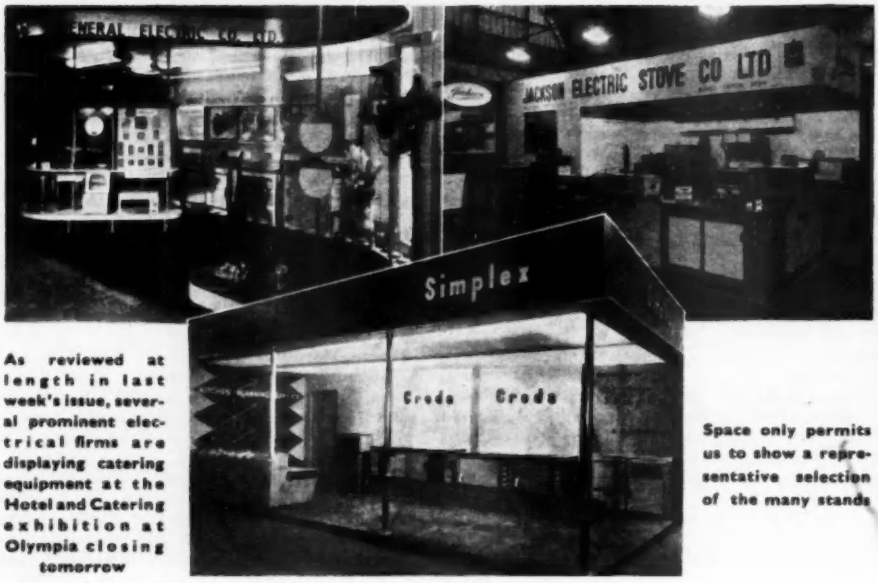
MR. GAITSKELL announced on Tuesday last an easement of shop window lighting restrictions. As from February 1, such display lighting is permissible between 5.30 p.m. and 7.30 a.m., Mondays to Fridays, for the next two months. It is also stated that it is unlikely that the old hours of 7 p.m. to 7.30 a.m. will be reimposed.

NEWS IN BRIEF

Eighty-four electric locomotives under construction at Gorton works of British Railways are to operate on the electrified Manchester to Sheffield line. Electrical equipment is to be installed by Met-Vick. The four traction motors, running from 1,500 V supply will together develop 1,868 h.p.

The London Packaging Exhibition will be staged in the National Hall, Olympia, from Tuesday, January 30, to Friday, February 9, 1951.

A record of 1,015,700 units were generated by Ford works Dagenham power house on January 26. Almost one-third of the total output was surplus to the factory requiremen ts and was passed to the national grid.



As reviewed at length in last week's issue, several prominent electrical firms are displaying catering equipment at the Hotel and Catering exhibition at Olympia closing tomorrow

Space only permits us to show a representative selection of the many stands

ELECTRIC SUPPLY NEWS

Arundel

The Housing Committee has submitted an estimate for installation of electricity in all Council properties not wired. This included 119 houses in Lancing and Sompting and 126 in the Parishes of Angmering, East Preston, Rustington and Warningcamp. On the basis that each house should be wired with a minimum of one lighting point per room, in addition to two points for small appliances, but with no provision for electric cooking or heating, the cost of providing main services and undertaking the necessary internal wiring was estimated at £27 per house, or £6,615 for the 245 properties involved. After it had been stated that the mains would be adequate for the installation of power points if they should be required the recommendation of the committee that the work be carried out subject to the approval of the Minister to a loan and a suitable increase in rents, was approved by the Council.

Brighton

The new substation at Rottingdean, in the ring main scheme round Brighton, was put into operation a few days ago.

Croydon

The Corporation Housing Committee has recommended that, as a precaution against fire, mains cut-out switches should be installed in 945 council bungalows, at an estimated cost of £4 10s. each.

Edinburgh

During discussions by the Housing Committee on the provisions of gas or electric cookers in new corporation housing estates, one member expressed the opinion that the time was coming when the Corporation would be unable to afford to give tenants a choice between gas or electric cooking. It cost about £30 18s. per house to put in both gas and electricity mains, it was stated, and the suggestion was made that the Electricity and Gas Boards should get together to decide a future policy.

Hatfield

Provided tenants would meet the cost by an additional charge on their rents, the Ministry of Health has approved Hatfield Rural Council's request for permission to install electricity in 250 council houses at a cost of £3,500.

Leicester

The agricultural and rural areas of Leicestershire were being developed by the East Midlands Electricity Board as fast as materials and labour would allow, Mr. W. F. Weston, sub-area manager, declared last week. The Board had between 40 and 50 schemes to supply electricity in village areas, and the materials were in hand for most of them.

Liverpool

Residents in the Lister Drive area have been complaining at the emission of smuts and dirt from that power station. Apparently much of the dust has been due to a fire which broke out a short time ago in the coal storage area. It has been stated that a recent delivery of coal had proved unsatisfactory for storing due to the ease of spontaneous combustion. It was now being used up at the rate of 1,000 tons a week.

Middlesbrough

The Town Council is informed that the Association of Municipal Corporations has been unable to reach any finality in their discussions with the British Electricity Authority regarding the terms and conditions to be adopted nationally for the provision of electricity supplies to new housing estates.

Northern Ireland

During the next two years the Electricity Board for Northern Ireland will extend supplies to a further 3,750 rural dwellings, at an estimated cost of £900,000, the Minister of Commerce stated last week.

S.W. Scotland

A scheme for the reinforcement of the existing supply system in Ayrshire, has been prepared by the South-West Scotland Electricity Board. The scheme, which is estimated to cost £1,200,000 and to take three years to complete, has been reviewed from a financial viewpoint in consequence of the recent cuts in capital expenditure, but in view of its essential character, the necessary approval has been received from the B.E.A.

At present Ayrshire takes a supply from points at Kilmarnock and Saltcoats, but it has been decided to limit the area in Central Ayrshire supplied from Kilmarnock, and to provide a new substation near Coylton to the east of Ayr to serve the southern part of the county. Consideration of various schemes and a comparison of costs has shown this to be the best engineering proposal and the most economical arrangement. The plan also has the added advantage of being capable of easy extension to meet the prospective demand for electricity of the National Coal Board in South Ayrshire as new coalfields are developed. It also obviates the necessity at this time to reinforce the supply point at Saltcoats, as it will be possible to transfer some of its load to the reinforced supply point at Kilmarnock, thus reducing to the utmost the cost of this necessary reinforcement.

LIGHTING SCHEMES

Bridlington.—The Illuminations Committee has decided not to undertake a scheme including tableaux and set pieces but to ask the Property, Entertainments and Sewerby Estate Committees

to offer suggestions for improving the lighting of the premises under their control, which are close by the sea front, with estimates of the cost.

Ealing.—The Corporation has been recommended to approve in principle a scheme for the improvement of street lighting in part of Western Avenue, at an estimated cost of £8,000.

Houghton-le-Spring.—The U.D.C. is to obtain tenders for the first part of the scheme for converting the gas street lighting to electricity.

Onchan (Isle of Man).—The Village Commissioners' application to borrow £2,400 for improved street lighting has been approved.

Sheerness.—The T.C. is to investigate the cost of decorative lighting along the sea front during the summer months.

St. Ives (Hunts).—The Town Council has approved a £3,260 scheme to provide 170 new street lamps, including 27 of the mercury-vapour type.

Truro.—The surveyor is to obtain estimates for providing main road lighting by metal filament lamps.

Wrexham.—The borough surveyor is to prepare estimates for the installation of sodium lighting on trunk roads.

COMPANY ACTIVITIES

Bylock Electric

Preliminary details disclose a trading profit for the year to July 31 last, after allowing for depreciation, but before taxation, amounting to £14,986, compared with a loss of £12,162 for the previous year. Tax absorbs £7,276. The Ordinary dividend is again passed, as last year. The company, it will be recalled, was converted into a public concern in June, 1947. Issued capital is £15,000 in Ordinary shares.

Electrical and Industrial Investment

For 1949, revenue amounted to £85,944 (*£80,622*). General expenses absorb £2,456 (*£2,274*), director's fees £1,500 (*same*), debenture interest £8,000 (*same*), interest £2,379 (*£1,511*), tax provision £32,456 (*£30,907*), leaving a balance of £39,153 (*£36,430*). Deferred ordinary dividend 20%, payable on March 3, leaving £21,003 (*£18,280*) to be transferred to undividend profits account.

English Electric Co. Ltd.

As anticipated, the offer of 4% debenture stock, for which lists opened on Tuesday of last week, was closed within two minutes. It was announced that the offer had been over-subscribed more than ten times. When dealings commenced on Monday last, the price started at 100½ and closed at 100⅞.

L. Sterne and Co. Ltd.

For the year to October 31, the full accounts show a net profit, after providing for depreciation £78,500 (*£74,000*) and taxation, amounting to £73,791 (*£59,248*). With £40,000 (*£30,000*) transferred to reserve there is £52,970 (*£35,844*). Current assets are listed at £1,002,418 (*£1,311,539*), including stock in trade and work in progress £591,139 (*£842,851*), debtors £406,067 (*£463,155*), and cash £5,211 (*£5,533*). Current liabilities and provisions amount to £537,384 (*£863,600*), including bank overdraft £95,843 (*£363,252*), creditors £351,105 (*£389,380*), and taxation £79,710 (*£100,243*). Outstanding commitments for capital expenditure amount to £36,000. The chairman states that since the end of the financial year, the works at Hillington have started the manufacture of small hermetically-sealed refrigerating machines for use in domestic and small commercial cabinets.

R. A. Lister & Co.

The full report shows a consolidated profit for the year to September 30 of £617,985 (*£598,838*), plus £7,691 (*£6,880*) investment income, making a total of £625,676 (*£605,718*). The sum of £34,298 (*£49,276*) representing profits on subsidiaries where there are current restrictions on remittances has been counterbalanced by the transfer to provision against assets of such companies. Depreciation of fixed assets £109,194 (*£94,615*), pensions £10,672 (*£6,717*), audit fee £3,682 (*£3,250*), and tax, including £50,000 (*nil*) to tax equalisation reserve, £270,586 (*£295,096*), leaving a balance of £231,542 (*£206,040*). Deduct minority proportion £765 (*£2,637*), plus unrequired tax nil (*£29,948*), exceptional profits on exchange £66,525 (*nil*) and other extraneous items £1,810 (*£7,403*), making £299,112 (*£240,754*). Profits retained by subsidiary companies £101,137 (*£8,384*), giving a net profit of the parent company of £197,975 (*£232,370*). With £248,264 (*£239,094*) brought in, there is £446,239 (*£471,464*) available. To general reserve is placed £75,000 (*£100,000*), preference dividend £9,900 (*same*), ordinary interim on £1,200,000 capital 5½% £33,000 (*same*), final dividend on £2,600,000 6½% £92,950 (*£85,800*), leaving £235,389 carried forward. Current assets of the group are listed at £5,987,640 (*£5,494,626*), including stocks at £2,759,866 (*£2,345,219*), and sundry debtors and bills receivable less provisions £1,225,065 (*£1,196,307*). Current liabilities amount to £4,224,754 (*£4,102,581*).

Dividends Declared

India Rubber Gutta Percha and Telegraph Co.—Dividend of 9% (*same*).

Scottish Cables.—Interim dividend of 10% (*same*).

Commercial Information

CONTRACTS OPEN

*The date stated is the last day for receiving tenders. Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House North, Millbank, London S.W.1, quoting reference number.*

February 3.—Belfast T.C.—Electrical apparatus and various accessories. Electricity Department, East Bridge Street, Belfast.

February 3.—Durham C.C.—Electrical installation to eight houses at Gilesgate Moor. County Architect's Office, Court Lane, Durham.

February 3.—Goole T.C.—Electrical work for 38 houses in Whincroft Avenue, Halifax Avenue, and Woodland Avenue. D. C. Kean, Borough engineer and surveyor, Municipal Offices, Goole.

February 3. — Sheffield T.C. — Installation of electrical services to 326 houses on Manor Park estate. W. Geo. Davies, City architect, Town Hall, Sheffield 1. Deposit £1.

February 3.—Tottenham T.C.—Supply of electric lamps. M. Lindsay Taylor, town clerk, Town Hall, Tottenham, N.15.

February 3.—West Riding C.C.—Part rewiring of and additions to the electrical installation at Northgate Lodge, Pontefract. County architect, County Hall, Wakefield.

February 4.—Prestwich T.C.—Electric lamps and electrical equipment for 12 months ending March 31, 1951. Borough engineer, Town Hall, Prestwich.

February 4.—Sandbach U.D.C.—Installation of electricity to 115 houses and additions to service in seven houses. Engineer and Surveyor, Council Offices, Crewe Road, Sandbach.

February 4.—Swansea T.C.—Electric lamps for public lighting for twelve months from April 1. Borough engineer and surveyor, Guildhall, Swansea.

February 6.—Chester T.C.—Electrical installation at Hanbridge secondary modern school. City engineer and surveyor, Municipal Offices, 43 Northgate Street, Chester. Deposit £2 2s. Advertised in December 15 issue.

February 6.—Hull T.C.—Electrical installation to four blocks of three-storey flats (24 flats) on Southcoates Lane estate. City Architect's department, Guildhall, Hull. Deposit £1 1s.

February 7.—Stoke-on-Trent T.C.—Six months' supply of electric lamps. City Surveyor, Town Hall, Stoke-on-Trent.

February 8.—Basingstoke.—Supply of electric lamps for six months, beginning April 1, for Park Prewett Group Hospital management committee. No. 47, Basingstoke, Hants.

February 8.—Crumlin R.D.C.—Supply of electrical pumps: two close coupled pumps, each capacity 7,500 gallons per hour against total head of 270 ft; two close coupled pumps, each capacity of 20,000 gallons per hour against total head of 25 ft; and two close coupled pumps, each capacity of 20,000 gallons per hour against total head of 200 ft. W. D. R. and R. T. Taggart, civil engineers, Castle Arcade Buildings, Belfast.

February 8.—Great Yarmouth T.C.—Year's supply of electric cables from April 1. Borough engineer's office, Town Hall, Great Yarmouth. Advertised in January 19 issue.

February 8.—Lancashire C.C.—Electric lighting and power installation at junior and infants' school, Moss Lane, Litherland. R. H. Adcock, Clerk of the County Council, County Offices, Preston.

February 8.—Mitcham T.C.—Twelve months supply of electric lamps from April 1. Borough engineer and surveyor, Town Hall, Mitcham.

February 8.—Wembley T.C.—Supply of electric lamps for one year from April 1. Borough engineer and surveyor, Town Hall, Wembley.

February 9.—Kidsgrove U.D.C.—Electrical installations to 104 houses on Crown Bank and Golleys Bank estates. Engineer and Surveyor, Town Hall, Kidsgrove. Deposit £2 2s.

February 10.—Carlisle T.C.—Provision and erection of lighting columns complete with lanterns in London Road and Newtown Road. City Engineer, 18 Fisher Street, Carlisle.

February 10.—Droitwich T.C.—Electrical installation in 218 council houses. G. L. Robinson, engineer and surveyor, Town Hall, Droitwich. Deposit £2 2s. Advertised in Jan. 19 issue.

February 10.—India.—High tension lead sheathed cable. Director-General, Industry and Supply New Delhi. B.o.T. (Ref. C.R.E. (IB) 40440/50).*

February 10.—Staffordshire C.C.—Complete portable electric welding kit. County surveyor, R. S. Mart, County Buildings, Stafford.

February 11.—Aberfeldy T.C.—Installation of electric light in Burgh houses in Tayside Place, Tayside Crescent, Market Street, Chapel Street, and Breadalbane Terrace. Burgh Surveyor, Aberfeldy.

February 11.—Durham C.C.—Electrical installation at East Hetton new county school. County Architect's office, Court Lane, Durham.

February 11.—Rothwell U.D.C.—Fifty-three high pressure sodium electric discharge lamps for various street lighting schemes. Engineer and surveyor's department, Civic Buildings, Rothwell, Leeds. Advertised in January 26 issue.

February 11.—Tettenhall U.D.C.—Supply, delivery and erection of street lighting on trunk road A41. J. W. Mason, Engineer and Surveyor, Council Offices, Tettenhall. Deposit £2 2s.

February 13.—Aldershot T.C.—Erection of nine electric lamp columns at Ash. F. W. Taylor, Borough Engineer and Surveyor, Municipal Buildings, Aldershot. Deposit £1 1s.

February 13.—Southport T.C.—Electrical installations in permanent houses to be erected at the following sites: Four houses and four flats at Site No. 2, Drewitt Crescent; 12 houses at site No. 13, Balmoral Drive. Borough Engineer's Office, Town Hall, Southport.

Due to limitation of space, Overseas Contracts are only published twice in the above section. A complete list is available for reference at our offices.

February 13.—Wrexham R.D.C.—Wiring for electric light and power of 50 houses on the Rhosymedre site, Cefn, and 20 houses on the Bryn-y-Brain site, Rhos. Engineer and Surveyor, D. E. Edwards, Imperial Buildings, Regent Street, Wrexham. Deposit £2 2s.

February 14.—Birmingham T.C.—Electric wiring in huts at Billesley Common Camp, Yardley Wood, Birmingham 14. W. Smith, general manager, Estates Department, 19-24 Summer Road, Birmingham 3.

February 15.—East Kilbride Development Corporation.—Year's supply of electric domestic cookers and wash boilers from April 1. J. H. McLusky, Secretary, Torrance House, East Kilbride.

February 17.—Belfast T.C.—Supply and delivery of a loud speaking telephone installation. J. Dunlop, town clerk, City Hall, Belfast. Deposit £1 1s. Advertised in this issue.

February 18.—Derbyshire C.C.—Twelve months' supply of cables, conduit, lamps and electrical accessories. County Architect, St. Mary's Gate, Derby. Applications before February 4.

No date stated.—Roxburgh T.C.—Electrical work for (*a*) conversion of Croft House, and (*b*) Newton School kitchen and dining centre. County architect, County Offices, Newtown St. Boswells.

No date stated.—Renfrew C.C.—Electrical work for 32 houses at Busby, 20 at Bridge of Weir, and 20 at Houston. County Engineer, 16 Back Sneddon Street, Paisley.

No date stated.—Prudhoe-on-Tyne U.D.C.—Electrical installation at 66 new houses. Architect, J. M. Angus, Hanover Square, Newcastle-on-Tyne.

No date stated.—Ryton-on-Tyne U.D.C.—Electric lighting and heating work at 32 houses on Runhead estate. Council's Surveyor, Council Offices, Ryton.

CONTRACTS CLOSED

B.E.A.—Contracts placed during the month for power station, switching and transforming station and transmission equipment amount in aggregate to £1,807,294 and include: Battersea "B" generating station: 3,300-V auxiliary switchgear (Ferguson Pailin, Ltd.); Barking generating station: coal handling, storing and reclaiming plant (General Electric Co., Ltd.); Brunswick Wharf generating station: foundations and civil engineering work for second half of station (Peter Lind and Co., Ltd.); Littlebrook "C" generating station, Kent: ash and dust handling plant (Babcock and Wilcox, Ltd.) and auxiliary switchgear and accessories (British Thomson-Houston Co., Ltd.); Keadby generating station, Yorkshire: ash and dust handling plant (Babcock and Wilcox, Ltd.); Thornhill generating station, Dewsbury, Yorkshire: main auxiliary and multicore cables and accessories (British Insulated Callenders Cables, Ltd.); Rugby substation: 132 kV 2,500 MVA switchgear (British Thomson-Houston Co., Ltd.); and Slough substation: 132 kV 2,500 MVA switchgear (A. Reyrolle and Co., Ltd.).

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Cosmo Electrical Trading Co., Ltd.—Meeting to receive liquidators' report at 2-5 Old Bond Street, W.1, on February 28, at 3 p.m.

Mayfield Electrics, Ltd.—Meeting of creditors at 122-4 High Street, Staines, Middlesex, on February 17, at 3 p.m.

BANKRUPTCY ACTS

Birmingham.—Ellen Morris, 264 Walsall Road, Perry Bar, Birmingham, lately carrying on business at 120 Park Road, Aston, Birmingham, under the style of F. Austin and Co. First meeting at Official Receiver's Office, Somerset House, 37 Temple, Birmingham 2, on February 7, at 11.45 a.m. Public examination at the Court House, Corporation Street, Birmingham, on March 16 at 2.30 p.m.

PRICES OF CABLE MATERIALS
(at Tuesday night)

COPPER, electrolytic	£153	0	0
LEAD, good soft pig (foreign)	97	0	0
" "English" quality ...	98	10	0
TIN (99·99·75%) ... (Cash) ...	£599½		—£600
" (3 months)	£581		—£581½
ALUMINIUM, commercial purity (del.)	112	0	0
ARMOURING:			
Galv. Steel Wire (0·104 in.)	39	10	0
Mild Steel Tape (0·04 in.)	26	0	0
Note. Figures quoted are M.o.S. spot prices. For future prices the following premiums must be added:—			
For Copper delivered in 2nd or 3rd month after order (per ton) ...	2	10	0
For Copper delivered in 4th, 5th and 6th month after order (per ton) ...	5	0	0
For Lead delivered in 2nd or 3rd month after order (per ton) ...	2	0	0

BUSINESS NOTICES

Changes of Address.—The address of the Chester branch of BRITISH INSULATED CALLENDER'S CABLES, LTD., has now moved to 1 Stanley Street, Watergate Street. Telephone: Chester 396.

The firm's address at Cambridge has also been changed to 61A Regent Street, but the 'phone number remains unaltered (Cambridge 56318).

Concessionaires.—H. J. SCOTT AND CO. (BELFAST), LTD., have appointed H. Vaultier and Co., Siege Social, Calcada Marques De Abrantes 43-45, Lisbon, Portugal, as their sole concessionaires in that country.

New York Showrooms.—Berrys Electric Ltd., have opened new showrooms at 225 Fifth Avenue, New York, N.Y. They will be under the supervision of the sole American agents, S.P. Skinner Co., Inc.

As from February 1, the UNIVERSAL ELECTRICAL CO. is controlled and operated by U.E.C. (ROTARY CONVERTERS) LTD. The trading name of Universal Electrical Company will continue to be used.

Truck Sales.—As from February 1, 1950, the sales of "Electricar" industrial trucks, formerly marketed by Crompton Parkinson Ltd., became the responsibility of I.T.D. LTD., Stacatruc House, 142 Sloane Street, S.W.1, a subsidiary of Austin Crompton Parkinson Electric Vehicles Ltd.

The AUSTRALIAN DEPARTMENT OF TRADE AND CUSTOMS has decided that alternators, used generally in conjunction with a voltmeter for electrical measuring purposes, have been classified under the British preferential tariff with duty at 22½% *ad valorem*.

PROSPECTIVE BUSINESS

Banchory T.C.—All trades work in erection of public conveniences and shelter in High Street. Burgh Surveyor, Council Buildings, Banchory.

Berkshire C.C.—Erection of hutted classrooms and cloakroom accommodation for Maidenhead county boys' school. County Architect, Wilton House, Parkside Road, Reading.

Biddulph U.D.C.—Erection of 11 pairs of three-bedroomed, 9 pairs of two-bedroomed, and 3 pairs of one-bedroomed houses. W. James Venables, 1 West Road, Congleton.

Billericay U.D.C.—Erection of five blocks of flats, comprising 20 one-bedroomed flats at Seven Acres, Wickford, site. Surveyor, Council Offices, 98 High Street, Billericay.

Blackburn T.C.—Erection of 44 houses on Higher Croft estate, Blackburn. Borough Engineer, Town Hall, Blackburn.

Blandford R.D.C.—Erection of 14 dwellings in Tarrant Hinton. T. H. Cullen Davies, clerk, Council Offices, 10 Market Place, Blandford.

Bolton T.C.—Erection of 16 three-bedroomed flats on Harpers Lane estate. Housing Director, Town Hall, Bolton.

Bootle T.C.—Erection of 16 dwellings at Anglesey Street, Bootle. Borough engineer and surveyor, Town Hall, Bootle, Lancs.

Brigg U.D.C.—Improvements to the Corn Exchange. Estimated cost, £6,000. A. R. Haynes, 8 Wrawby Street, Brigg, Lincs.

Bristol T.C.—Erection of two factory buildings at Brislington trading estate. J. N. Meredith, City Architect, Eagle House, Colston Avenue, Bristol 1.

Bungay U.D.C.—Erection of nine pairs of houses at Hillside Road. Buckingham and Berry, 31 Prince of Wales Road, Norwich.

Castleford U.D.C.—Erection of 46 houses. W. E. S. Barnes, clerk, Town Hall, Castleford.

Cheshire C.C.—Erection of Bromborough Acre Lane secondary school. E. Mainwaring Parkes, County Architect, The Castle, Chester.

Colchester T.C.—Erection of (a) 32 houses in section 1 and (b) 49 houses in section 2 at Shrub End site. J. S. Orchard, Borough Engineer, 64 West Stockwell Street, Colchester.

Cornwall C.C.—Provision of one extra classroom accommodation at Perranporth and St. Miniver county primary schools; two classrooms at Truro girls' senior school, Redruth boys' grammar school and Newquay primary girls' school; and one practical room at Pool. S. Gregson, County Architect, County Hall, Truro.

East Lothian C.C.—All trades work for erection of 74 houses. County architect, County Buildings, Haddington.

Great Yarmouth T.C.—Erection of 78 "Duplex" type houses in pairs at Magdalen College estate, Gorleston. Borough Engineer, 15 Regent Street, Great Yarmouth.

Haltemprice U.D.C.—Erection of 10 flats at Bacon Garth, Cottingham, 22 flats at Lowfield Road, Anlaby, and 28 flats at Hull Road, Hessle. Engineer, Anlaby House, Anlaby.

Helston T.C.—Erection of six two-bedroomed houses and four single-bedroomed flats on Beacon Park estate, Helston, and four two bedroomed houses on Boslam estate Porthleven. S. Askew, Town Clerk, The Guildhall, Helston.

Hove T.C.—Erection of 36 flats in one block on Sunninghill estate. T. R. Humble, Borough Surveyor, Town Hall, Hove.

Ladybank T.C.—All trades in work for erection of 10 houses in four blocks. L. A. Rolland, Architect, The Albion House, Shorehead, Leven, Fife.

Lindsey.—Standing Joint Committee approved scheme involving erection of three transmitting stations for two-way high-frequency wireless service for police.

Malton U.D.C.—Erection of 26 semi-detached houses on Peasey Hills Road site. G. D. Channon, Council Architect, Market Street, Malton.

March.—New Roman Catholic church proposed at cost of £11,000. C. W. Glover and Partners, 54 Victoria Street, S.W.

Middlesbrough T.C.—Erection of 72 houses for section 3 of Beechwood site. Borough Engineer and Surveyor.

Morley T.C.—Erection of 30 houses at Vicarage Avenue, Gildersome. Housing Director, M. H. Brook, National Provincial Bank Chambers, Queen Street, Morley.

Orrell U.D.C.—Erection of 38 houses. F. Butterfield, Engineer and Surveyor, Council Offices, Orrell Post, Near Wigan.

Petworth R.D.C.—Erection of 34 houses and four flats at Kirdford. Architect, Godman and Kay, 13 North Parade, Horsham.

Southgate T.C.—Erection of block of 11 flats at Avenue Road. Borough Engineer and Surveyor, Town Hall, Palmers Green, N.13.

Strabane R.D.C.—Erection of four houses at Clady and 16 at Ardstraw. M'Carthy and Lilburn, Surveyors, Scottish Provident Buildings, Belfast.

YOUR QUERIES ANSWERED

"Collaro" fan and heater, makers of? T.E.—Collaro, Ltd., Ripple Works, By-Pass Road, Barking, Essex. (17585)

"Nico-Caloray" fires, makers of? T.E.—Nico Light Co., Ltd., 1 Laud Street, Croydon, Surrey. (17590)

Slotted steel angle iron for switchgear, makers of? T.E.—Constructors, Ltd., Tyburn Road, Erdington, Birmingham; Slotted Steel Bar and Allied Products, 36 Cannon Street, Birmingham 2. (17594)

"Bencolite" lamp shades, makers of? H.H. Benjamin Electric, Ltd., Brantwood Works, Tariff Road, London N.17. (17604)

"Vega" washing machine, makers of? K.E.—These were made by Hunting Aviation, Ltd., a concern which went out of business last year. The Henderson Safety Tank Co., Ltd., 6 Elstree Way, Boreham Wood, undertake repairs. (17609)

HE. heaters, makers of? B.C.—Heatovent Electric Ltd., 250/254, West George St., Glasgow, C.2. (17618)

The above are selected from the questions we have answered this week. If you have a query, send it to us.

COMPANY REGISTRATIONS

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Arthur Parker (Decorators) Ltd., 15 and 17 The Green, Broadway, Worcs. To take over business of a decorator, builder, contractor and electrician carried on at High St., Broadway, Worcs., by A. Parker. Cap.: £2,000 in £1 shares. Dirs.: A. Parker, E. J. Roberts, J. W. Foulkes, and F. R. Keyte.

C. N. Whitfield and Co. Ltd., 154 Whitley Rd., Whitley Bay, Northumberland. To take over the business of electrical engineers carried on as "C. N. Whitfield and Company" at Whitley Bay by C. N. Whitfield and T. W. Dodshon. Cap.: £2,000. Dirs.: C. N. Whitfield, T. W. Dodshon, and L. T. D. Heppell.

Denis Allsopp and Co. Ltd., 95a Villa Rd., Handsworth, Birmingham. Electrical engineers and contractors, etc. Cap.: £100. Dirs.: D. Allsopp and W. B. Moore.

Rota Radio and Television, Ltd., 18 Corporation Street, Manchester 4. Cap.: £10,000. Dirs.: G. M. Blair and Betty Roland.

TRADE MARK APPLICATIONS

This information is extracted from the Official Journal by permission of the Controller.

Aerodyne. B668,236. Class 11. Air conditioning, ventilating and dust extracting installation and apparatus. Musgrave and Co., Ltd., St, Ann's Works, Albertbridge Road, Belfast, Northern Ireland.

Brillon. 681,340. Class 9. Electric cables, electric insulated wire and fuse wire. British Valve and Electrical Mfg. Co. Ltd., 19/25 Cropley Street, London N.1.

Key. 650,877. Class 17. Ducts, pipes and conduits, all for carrying electric wiring and for use in electric distribution systems and bird guards (being insulators) for electric wires and cables; all the aforesaid goods being made of fibrous materials. The Key Eng. Co., Ltd., 4 Queen Victoria Street, London E.C.4.

Primax. 674,696. Class 7. Electric wire-rope hoists. Wharton Crane and Hoist Co., Ltd., Station Road, Reddish, Lancs.

Rondo. 679,104. Class 9. Wireless apparatus and loudspeakers. W. Burkle, Sarweystrasse 40/46, Stuttgart-N, Germany.

MEETINGS TO NOTE

THURSDAY, FEBRUARY 2

A.S.E.E. (S. London branch).—"Plastics," Mr. H. E. J. Butler. Cafe Royal, North End, Croydon.—8 p.m.

I.E.E. (London meeting).—"Fault-Throwing Tests on the 132 kV Grid System under Normal Working Conditions." Institution Building, Savoy Place, W.C.2.—5.30 p.m.

FRIDAY, FEBRUARY 3

I.E.S. (Bath and Bristol centre).—"American Lighting Trends," A. L. Randall. Grand Hotel, Bristol.—7 p.m.

I.E.E. (N.E. Students Section).—"Electrical Technique Applied to Fuel Injection Equipment for Road Transport Vehicles." R. C. T. Stead, Grey Hall, King's College, Newcastle.—7 p.m.

SATURDAY, FEBRUARY 4

A.S.E.E. (Liverpool branch).—"Time and Motion Study," Mr. R. Hunt. The Liverpool Engineering Society, Dale Street, Liverpool.—6.30 p.m.

MONDAY, FEBRUARY 6

I.E.S. (Sheffield centre).—"The Latest in Electric Lamps," H. L. Privett. Medical Library, The University, Western Bank, Sheffield 10.—6 p.m.

A.S.E.E. (Sheffield branch).—"Estimating," E. J. Mullholland. Royal Victoria Station Hotel, Sheffield.—7.30 p.m.

A.S.E.E. (N.E. London branch).—"Power Cables," H. E. Tickner. Mawney's Arms,M awney's Road, Romford, Essex.—8 p.m.

TUESDAY, FEBRUARY 7

I.E.E. (N. Midland centre).—"The Design, Specification and Performance of H.V. Surge Diverters," F. Jones and C. J. O. Garrard. Yorkshire Electricity Board, 1 Whitehall Road, Leeds.—6.30 p.m.

BRITISH WELDING RESEARCH ASSOCIATION.—"Research and Production" exhibition. (Open until February 11.). Association headquarters, 29 Park Crescent, W.1.

E.P.E.A. (Worcester meeting).—"Power Stations, Past and Present," F. W. Lawton. Recreation Club Rooms, Hylton Road, Worcester.—7 p.m.

I.E.E. (N. Western centre).—"The Motor Uniselector and the Technique of its application in Telecommunications," W. H. Grinsted. Engineers' Club, Albert Square, Manchester.—6.15 p.m.

A.S.E.E. (S.E. London branch).—"Cold Cathode Lighting," E. A. Langsdon. Castle Hotel, High Street, Eltham.—8 p.m.

A.S.E.E. (West London).—"Electric Resistance Welding," H. E. J. Butler. Hammersmith Town Hall.—7.30 p.m.

WEDNESDAY, FEBRUARY 8

I.E.E. (N. Lancs. sub-centre).—"The Phase/Neutral System of Supply for Rural H.V. Distribution." N.W.E.B. Demonstration Theatre, North Road, Lancaster.—7 p.m.

A.S.E.E. (Bradford branch).—"The Heating and Lighting of Office Buildings," L. M. Bruce. Midland Hotel, Bradford.—7.30 p.m.

A.S.E.E. (Kent branch).—"Refrigeration." Royal Star Hotel, Maidstone.—7.30 p.m.

THURSDAY, FEBRUARY 9

INC. PLANT ENGRS. (Newcastle-on-Tyne).—"Approach to Industrial Lighting Problems," R. B. Wingate. Turks Head Hotel, Newcastle.—7.15 p.m.

I.E.S. (Cardiff centre).—"Lighting of Architecture," G. Grenfell Baines. S. Wales Electricity Board Demonstration Theatre, The Hayes, Cardiff.—5.45 p.m.

I.E.E. (Bristol students' section).—"Protective Systems in A.C. Networks," J. Gillians. Electricity House, Bristol.—7 p.m.

I.E.S. (Leicester centre).—"Transport Lighting," J. N. Hull. Demonstration Theatre, E. Midlands Electricity Board, Leicester sub-area, Charles Street, Leicester.—6.30 p.m.

E.P.E.A. (Northern Meter group).—"Some Westinghouse Power Supply Devices for Laboratory and Test Room Power Supplies," S. A. Stevens. Engineers' Club, Albert Square, Manchester.—7 p.m.

EXHIBITION OF FRENCH SCIENTIFIC INSTRUMENTS.—Science Museum, South Kensington (Open until Feb. 26).

FRIDAY, FEBRUARY 10

E.P.E.A. (Southern Meter Engineers' group).—"Protective Gear: Design and Testing of Circuitry and Components," J. G. Welling. Caxton Hall, Westminster.—6.30 p.m.

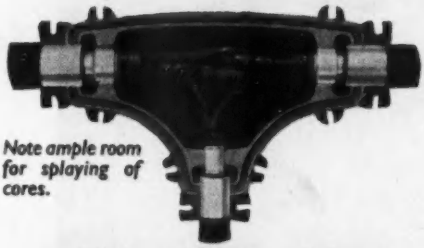
I.E.S. (Birmingham centre).—"Lighting in Mines—with Special Reference to Flame Proof Equipment," F. W. Sharpley. Imperial Hotel, Temple St., Birmingham.—6 p.m.

A.S.E.E. (Nottingham branch).—"Lumens, Lamps and Lighting," C. S. Caunt. G.E.C. Showroom, Stoney Street, Nottingham.—7.30 p.m.

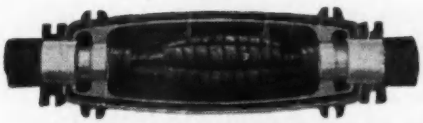
SATURDAY, FEBRUARY 11

I.E.E. (N. Midland students).—"The Historical Development of the Induction Type Energy Meter," C. Adamson. Yorkshire Electricity Board Offices, Ferensway, Hull.—2.30 p.m.

BOXES YOU CAN BURY AND FORGET



Note ample room for splaying of cores.



Completed Multicore Joint (above) and Box with top half in position (below).

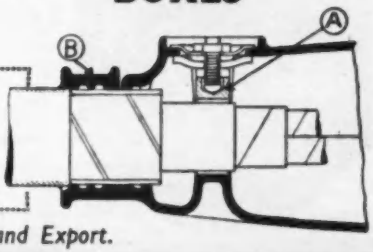
The design of HENLEY "Cablegrip" type Boxes is based on years of experience of practical jointing conditions, and incorporates all those features which facilitate jointing operations. Their complete reliability bears out our claim for these boxes—that you can "*bury and forget.*"

The range of "Cablegrip" type boxes include Straight Through, Service and Branch Boxes for underground installation. The "Cablegrip" gland and armour clamp, which is a feature of the boxes, is illustrated below.

HENLEY

"CABLEGRIP" STRAIGHT THROUGH SERVICE & BRANCH BOXES

The "Cablegrip" gland and armour clamp provides two wide bearings for the cable. A highly efficient bond to the lead sheathing is effected by means of a cast iron shuttle (A) and to the armouring by means of a cast iron armour clamp (B).



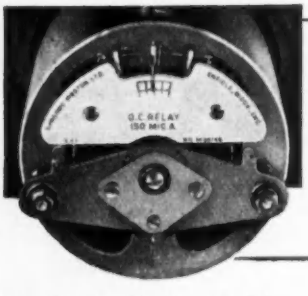
Available for Home and Export.

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD.
51–53, HATTON GARDEN, LONDON, E·C·1

FEATURES OF WESTON SUPERIORITY

Weston
MOVING COIL RELAYS

This modern range of relays is ideal for all Laboratory or Industrial Purposes. Built on the permanent-magnet moving coil principle, unaffected by external magnetic fields, the precious metal contacts will not oxidise or tarnish, and the high torque developed ensures positive contact pressure. Supplied in Bakelite casing. Most applications call for special requirements and enquiries should therefore enclose a diagram of the circuit to be closed and state (a) High and/or low contact adjustment; (b) mounting position; (c) resistance; (d) values of current and voltage in local circuit and whether DC or AC; (e) values of resistance and any inductance or capacitance in local circuit; and (f) any special accuracy required. Every 'Weston' relay is specially designed to give the best possible performance for its individual purpose. (The Model illustrated is S54.)



ACCURACY OF ADJUSTMENT. Special note should be made of the reduction gearing which enables the *user* to make accurate adjustment with absolute ease. The accuracy and rigidity of the mounting ensures constant centring after adjustment. Yet another special 'Weston' feature.

SANGAMO WESTON LIMITED

ENFIELD, MIDDLESEX. Tel.: Enfield 3434 (6 lines) & 1242 (4 lines)

I.23

CLASSIFIED ADVERTISEMENTS

Official Tenders and Appointments · Situations Vacant · For Sale · Wanted

APPOINTMENTS VACANT

None of the vacancies in these columns relates to a man between the ages of 18 and 50 inclusive, or a woman between the ages of 18 and 40 inclusive, unless he or she is excepted from the provisions of the Control of Engagement Order, 1947, or the vacancy is for employment excepted from the provisions of that Order.

NORTH WESTERN ELECTRICITY BOARD

No. 6 Sub-Area

APPOINTMENT OF ASSISTANTS TO DISTRICT CONSUMERS' ENGINEERS

APPLICATIONS are invited for the positions of Assistants to District Consumers' Engineers in all districts of the No. 6 Sub-Area. The provisional salaries for the posts will be as follows :—

Barrow: N.J.B. Schedule, Grade 7, Class "G," £534-£565 per annum. Kendal: N.J.B. Schedule, Grade 7, Class "F," £518-£528 per annum. Whitehaven: N.J.B. Schedule, Grade 7, Class "F," £518-£528 per annum. Workington: N.J.B. Schedule, Grade 7, Class "F," £518-£528 per annum. Penrith: N.J.B. Schedule, Grade 7, Class "F," £518-£528 per annum. Carlisle: N.J.B. Schedule, Grade 7, Class "G," £534-£565 per annum.

The salaries are provisional and are subject to negotiation with the appropriate body.

The duties of the posts are to assist the District Consumers' Engineers generally in advising consumers on all matters concerning electricity service, preparation of specifications and estimates, organisation and supervision of industrial and domestic installation work, the supervision of domestic appliance repairs, control of showrooms and publicity, etc. Applicants should preferably have a National Certificate in Electrical Engineering or its equivalent.

Candidates should state the post for which they are applying and separate applications should be submitted if they desire to be considered for more than one position.

Applications, stating age, qualifications and experience, present position and salary, should be received by the Establishment Officer, The North Western Electricity Board, Cheetwood Road, Manchester 8, not later than Saturday, February 11, 1950. (D 531)

HIS MAJESTY'S COLONIAL SERVICE

VACANCIES exist in the Government Electricity Undertakings, Nigeria, for (a) ELECTRICAL ENGINEERS and (b) MECHANICAL ENGINEERS.

Candidates for (a) must possess associate membership of the Institution of Electrical Engineers or an electrical engineering degree. In addition, they must have had a sound training in electrical engineering and wide experience in the construction, maintenance, and operation of 6·6/11 kV and low-voltage overhead and underground distribution networks with a.c. sub-stations. Sales development and commercial experience is also desirable. Selected officers will be required to take charge of small undertakings in the Colony or to carry out duties under a senior engineer.

Candidates for (b) must possess associated membership of the Institution of Mechanical Engineers or an engineering degree, and have had a sound engineering training, including practical experience of Babcock boilers, steam turbines, reciprocating steam and internal combustion-engined generating plant, and gas producers. The duties of the post are mainly to supervise the operation and maintenance of the above equipments in power stations throughout the territory.

Candidates must be British subjects, physically fit, and should be between the ages of 26 and 40. Appointments will be on probation for permanent and pensionable employment within the gross incremental salary scale £660 to £1,300 per annum, point of entry depending on age, civil experience, and length of approved war service. Partly furnished Government quarters are provided, if available, at a rent of £60 to £90 per annum; free first-class passages for the officer and, if married, for his wife, once each way each tour; and home leave on full pay after tours of 18 months at the rate of seven days for each month of resident service.

Intending candidates should write at once to the Director of Recruitment (Colonial Service), Sanctuary Buildings, Great Smith Street, S.W.1, stating age, professional qualifications, and brief details of relevant experience. Please quote reference No. 27326/19. (D 542)

ELECTRICITY SUPPLY COMMISSION SOUTHERN RHODESIA

VACANCIES exist for the following posts :—

(1) DISTRICT ENGINEER.

Applicants must have held a similar position with a bulk supply electricity undertaking operating a large rural transmission system, and must be familiar with the operation and maintenance of automatic on load tap changing transformers and auto-reclosing switchgear up to 132 kV; experience on urban electric supply work not essential; minimum technical qualification A.M.I.E.E. or equivalent.

(2) FIELD ENGINEER

Applicants must have experience in the erection of transmission lines and sub-stations up to 132 kV; knowledge of erection of A.C.S.R. and copper on fabricated towers, steel tubular and wood poles, and ability to control large construction gangs of European linesmen with native labour essential. Applicants should be able to compile records and reports, and they must be prepared to camp out in a caravan permanently. Possession of A.M.I.E.E. or equivalent an advantage.

Basic salary scales : District Engineer, £798 by £31 10s. to £892 10s. p.a.; Field Engineer, £672 by £31 10s. to £766 10s. p.a.

Both plus cost of living allowance now approximately 24 per cent., plus children's allowances and/or dependent allowances where applicable, generous leave conditions, Provident Fund, Holiday Fund, Medical Aid, etc.

Applications should give date and place of birth, school attended, subsequent technical training, examinations passed, practical training giving employers in chronological order and type of work done, marital state with number of children and should be forwarded to the Secretary, Electricity Supply Commission, P.O. Box 377, Salisbury, Southern Rhodesia, so as to arrive not later than February 25, 1950. (D 450)

EASTERN ELECTRICITY AUTHORITY

APPLICATIONS are invited from suitably qualified candidates for the following appointments :—

Norfolk Sub-Area

COMMERCIAL ASSISTANT (SALES)
Great Yarmouth and Lowestoft District

Applicants should have had a good all-round training in electrical engineering and possession of the Higher National Certificate or its equivalent will be an advantage. Experience in the application and utilisation of electricity to all domestic, commercial and industrial purposes is essential together with experience in showroom management embracing hire purchase transactions, application of tariffs, window display, publicity, demonstrations and exhibitions, and the successful candidate will be responsible to the Commercial Officer for these functions.

The provisional salary for the appointment will be £580 per annum.

Applications, stating age, education, qualifications, experience and present appointment and salary should be addressed to: The District Manager, Great Yarmouth, Eastern Electricity Board, Regent Road, Great Yarmouth, so as to reach him not later than fourteen days after the appearance of this advertisement.

Northmet Sub-Area

SALES ASSISTANT
Edmonton District

Applicants should have technical training, preferably to that of the National Certificate of Electrical Engineering. The person appointed will be required to prepare estimates and specifications of electrical installations under the general supervision of the District Commercial Officer.

The provisional salary will be between £270-£450 per annum, plus £30 London Weighting at a point dependent upon qualifications and experience.

Application forms may be obtained from: The District Manager, Edmonton, Eastern Electricity Board, Fore Street, Edmonton, to whom they should be returned when completed within fourteen days after the appearance of this advertisement.

Both salaries quoted are provisional and future salaries and conditions of service will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination. (D 554)

COUNTY BOROUGH OF BARROW-IN-FURNESS

Borough Engineer and Surveyor's Department

STREET LIGHTING ASSISTANT

APPLICATIONS are invited for the permanent appointment of Senior Engineering Assistant (Street Lighting) on Grade VI of the National Scales of Salaries for Local Authorities' Staffs, £595–£680 per annum.

The commencing salary will be fixed within the limits indicated according to the qualifications and experience of the successful applicant.

Candidates must have had experience in the layout and maintenance of street lighting preferably both by gas and electricity.

The possession of a recognised professional qualification is essential.

The Council has accepted the principle of providing Housing accommodation.

Further details of the post, conditions of appointment and forms of application may be obtained from the Borough Engineer and Surveyor, to whom completed applications must be returned not later than Monday, February 20, 1950.

Canvassing in any form will disqualify.

LAWRENCE ALLEN,
Town Clerk.
(D 513)

BRITISH ELECTRICITY AUTHORITY

BRITISH ELECTRICITY AUTHORITY invite applications for the following vacancies in the drawing office at headquarters in London :—

DRAUGHTSMEN (aged 21-25) with experience in one or the following:—

(a) Electrical diagram work.
(b) Over line detailing.
(c) Structural steelwork, design and detailing.

SENIOR DRAUGHTSMEN AND DRAUGHTSMEN

Experienced in generating station layout.

FEMALE TRACERS

PRINT ROOM OPERATOR with experience in one or more of the following:—

Dyeline printing, reflex printing, photostat machine, photography.

Salaries, which should be regarded as provisional until final scales have been agreed with the appropriate negotiating organisations, will be in accordance with age and experience within the following ranges:—

Draughtsmen: £312 per annum, at age 21, to £468, at age 25, rising to a maximum of £500 per annum.

Senior Draughtsmen: Grade "A," £500 to £600 per annum. Grade "B," £600 to £700 per annum.

Tracers: £119 per annum, at age 16, to £286 at age 21, rising to a maximum of £338 per annum.

Print Room Operator: £179 per annum at age 18, rising to £415 per annum at 33.

The appointments will be superannuable and successful candidates may be required to pass a medical examination.

Application forms may be obtained from D. Moffat, Director of Establishments, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, and should be completed and returned to him not later than February 18, 1950.

Please quote reference AE 47. (D 518)

BOROUGH OF WILLESDEN

APPOINTMENT OF ELECTRICAL ENGINEERING ASSISTANT

THE Council invite applications for the appointment of an Electrical Engineering Assistant on the permanent staff of the Borough Engineer and Surveyor's Department. The salary attaching to the post will be Administrative, Professional and Technical Grade III of the National Whitley Council Scale for the London Area, namely £450 per annum rising by £15 per annum to £495 per annum plus London Weighting according to age.

Candidates for the appointment must possess one or more of the following qualifications, namely the Higher National Certificate in Electrical Engineering, the Joint Section A examination of the Institution of Civil Engineers and the Institution of Electrical Engineers and in addition have some training and practical experience on general installation and maintenance of electrical engineering work.

The appointment, which will be terminable by one month's notice on either side, is subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

Applications, giving age, experience, etc., accompanied by copies of not more than three testimonials, should be addressed to the undersigned, endorsed "Electrical Engineering Assistant," not later than 10 a.m. on Friday, February 24.

It will be necessary for the successful candidate to provide his own housing accommodation as the Council is not in a position to assist.

Canvassing, directly or indirectly, will be deemed a disqualification.

R. S. FORSTER,
Town Clerk.

Town Hall, Dyne Road, Kilburn, N.W.6.
January 26, 1950. (D 557)

HIS MAJESTY'S COLONIAL SERVICE

A VACANCY exists for an ELECTRICAL ENGINEER in the Public Utilities Department, Gambia Colony. Salary within the scale £720–£1,300 per annum, point of entry depending on age, qualifications, and experience.

Candidates must be corporate members of the Institution of Electrical Engineers or hold equivalent qualifications, and should have served an electrical engineering apprenticeship and have a thorough knowledge of generation and distribution. Experience in construction and installation of overhead lines, underground cable network and outdoor and indoor sub-stations, voltage up to 11kV, and knowledge of radio telephony would be an advantage. The officers selected would be required to take charge of electricity undertakings in the colony.

Partly furnished quarters at low rentals, and free first-class passages each way each tour for the officer and his wife, if married, are provided. Home leave on full pay at the end of each tour of 18 months at the rate of seven days for each month of resident service. Income tax at local rate.

Intending candidates should write for application forms to the Director of Recruitment, Colonial Office, Sanctuary Buildings, Great Smith Street, S.W.1, giving brief details of age, qualifications, and experience, as soon as possible, quoting the reference number 27326/26. (D 544)

NATIONAL COAL BOARD

ELECTRICAL ENGINEER or PHYSICIST with knowledge of some aspect of the application of electronics (other than radio), is required in the Board's central research establishment at Stoke Orchard, near Cheltenham, for scientific investigation and development work. Candidates must be university graduates and should preferably have had some industrial or post-graduate experience.

Commencing salary, depending on qualifications and experience, in the Scientist Grade III scale, £350 by £25 to £650 per annum.

Apply, in writing, giving full particulars (in chronological order) of age, education, qualifications and experience (with dates) to National Coal Board, Establishments Branch (Personnel), Hobart House, Grosvenor Place, London S.W.1, marking envelope TT/185. Original testimonials should not be forwarded. Closing date March 3, 1950. (D 520)

BRITISH ELECTRICITY AUTHORITY

Merseyside and North Wales Division

APPLICATIONS are invited for the appointment of JUNIOR CHEMIST at the Percival Lane Power Station, Runcorn.

The salary will be in accordance with the National Joint Board Schedule, the appointment being in Class "J," Grade 10a, i.e. £367 per annum, rising to £383 per annum.

The appointment will be subject to medical examination and will be superannuable under the British Electricity Authority and Area Boards' Superannuation Scheme.

Applicants should have the Higher National Certificate, Intermediate B.Sc., or equivalent, or failing any of these a comprehensive practical training; power station experience would be an advantage, but is not essential. Specialised knowledge of fuels and fuel testing, water treatment, oils or metallurgy would be a recommendation.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, Mersey, side and North Wales Division, Clarke Gardens, Woolton Liverpool, and should be returned to him in a sealed envelope so as to be received not later than the first post on Monday, February 20, 1950. (D 526)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment :—

SHIFT ENGINEER—Little Barford Generating Station.

Salary in accordance with N.J.B. Schedule, Grade 8a, Class "J" (£526–£551 per annum).

Applicants should have served an apprenticeship and obtained an Ordinary National Certificate in Electrical and or Mechanical Engineering or equivalent and possess experience in the operation of power stations. Experience in the operation of plant at high steam pressure will be an advantage.

The salary is in accordance with the scale at present operating, but may be subject to negotiation through the medium of the Joint Board.

The appointment will be Superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Applications, stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than February 18, 1950. Envelopes should be endorsed "Shift Engineer, Little Barford."

W. N. C. CLINCH,
Controller.

Northmet House, Southgate, N.14. (D 530)

SOUTHERN ELECTRICITY BOARD

No. 3 (Portsmouth) Sub-Area

APPLICATIONS are invited for the appointment of SURVEYOR in the Isle of Wight District of the No. 3 (Portsmouth) Sub-Area. The provisional commencing salary will be £430 per annum on Grade "A" of the Extended Interim Scheme, with N.J.C. Conditions of Service. This salary is subject to adjustment by the appropriate negotiating machinery.

Applicants should have a good knowledge and experience of general survey work, be capable of pegging overhead lines and preparing profiles and plans of overhead lines from surveyed elevations. Experience of negotiating wayleaves will be an advantage.

The successful applicant will, subject to certain conditions, be required to contribute to the staff superannuation scheme, membership of which is compulsory.

Applications, on forms to be obtained from the Sub-Area Secretary, should be submitted to him at Lower Drayton Lane, Cosham, Portsmouth, in envelopes endorsed "Surveyor, Isle of Wight," within 14 days of the publication of this advertisement. (D 553)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

CONTROL ENGINEER, COVENTRY

APPLICATIONS are invited from suitably qualified Engineers for the position of Control Engineer, at Longford Generating Station, Coventry.

The salary and conditions of service will be in accordance with the N.J.B. Schedule, Class " J," Grade 9s.

Applicants should have experience in the operation of a power station switchboard and be fully conversant with high tension switching operations and protective systems.

Forms of application, which may be obtained from the Divisional Establishments Officer, British Electricity House, Barker Gate, Nottingham, should be returned not later than February 17, 1950.

W. S. BURGE,
Divisional Controller.

British Electricity House,
Barker Gate, Nottingham. (D 535)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments :—

No. 2 (Huddersfield) Sub-Area

MAINS ASSISTANT (Huddersfield District)
Vacancy No. 3/50

Applicants should hold the Higher National Certificate in Electrical Engineering or equivalent qualifications and have had experience in the construction, operation and maintenance of distribution networks, particularly overhead lines. Experience in a large supply undertaking is desirable.

Provisional salary in accordance with the National Joint Board Schedule, Class " H," Grade 8b, £465-£484 per annum, subject to negotiations with the appropriate organisations.

ESTIMATING, CONTRACTING AND APPLIANCE REPAIRS ENGINEER (Todmorden District)
Vacancy No. 120/49

Candidates should have had a sound technical education and practical training and must be capable of preparing and supervising schemes for all classes of industrial, commercial and domestic installations, including specifications, estimates and tenders, and must also be experienced in the repair and maintenance of domestic appliances.

Provisional salary in accordance with the National Joint Board Schedule, Class " E," Grade 8, £449-£469 per annum, subject to negotiations with the appropriate organisations.

Applications, stating the above vacancy numbers, giving age and full details of qualifications and experience, should be forwarded to the Manager, No. 2 (Huddersfield) Sub-Area, Yorkshire Electricity Board, Market Street, Huddersfield, within fourteen days of the appearance of this advertisement.

No. 7 (Grimsby) Sub-Area

FEMALE DEMONSTRATOR (Scunthorpe District)
Vacancy No. 8/50

Candidates must have had experience in the Service Centre of an Electricity Supply Authority, be able to conduct lecture demonstrations and advise consumers on the selection and use of electrical apparatus.

The possession of the Diploma of the Electrical Association for Women or an equivalent qualification will be an advantage.

Provisional salary £270 per annum, rising by annual increments of £20 to a maximum of £330 per annum, subject to negotiations with the appropriate organisations.

Applications, stating the above vacancy number, giving age and full details of qualifications and experience, should be forwarded to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Road, Grimsby, within fourteen days of the appearance of this advertisement. (D 524)

HIS MAJESTY'S COLONIAL SERVICE

VACANCIES exist for ELECTRICAL ENGINEERS in the Electrical Department, Gold Coast Colony. Salary within the scale £720-£1,300 per annum, including expatriation pay, i.e., £570 to £1,000 per annum basic salary plus expatriation allowance of £150 to £300 per annum; in addition a cost-of-living allowance of 15 per cent. of basic salary is payable. The post is either permanent and pensionable or on contract, and if on contract an extra 15 per cent. of the basic salary will be added. Point of entry in each case depending on age, qualifications, and experience.

Candidates must be corporate members of the Institution of Electrical Engineers or hold equivalent qualifications, and should have served an electrical engineering apprenticeship and have a thorough knowledge of generation and distribution. Experience in construction and installation of overhead lines, underground cable network and outdoor and indoor sub-stations, voltage up to 11 kV, and knowledge of radio telephony would be an advantage. The officers selected would be required to take charge of electricity undertakings in the Colony.

Furnished quarters at rents of £60 to £90 per annum, and free first-class passages each way each tour for the officer and his wife, if married, are provided. Home leave on full pay at the end of each tour of 18 months at the rate of seven days for each month of resident service. Income tax at local rates.

Intending candidates should write for further particulars and application form to the Director of Recruitment (Colonial Service), Colonial Office, Sanctuary Buildings, Great Smith Street, London, S.W.1, giving brief details of age, qualifications, and experience, as soon as possible, quoting the reference number 27326/16. (D 543)

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

STATION CHEMIST—NEEPSEND POWER STATION

APPLICATIONS are invited for the above appointment. Conditions of service and salary in accordance with the N.J.B. Schedule, Class " J," Grade 7, at present £606-£633 per annum.

Applicants should have a University Degree in Chemistry or A.R.I.C., but consideration will be given to those holding the Higher National Certificate in Chemistry who are pursuing a recognised course of study with a view to final qualification.

Applicants must have a sound knowledge of modern power station chemical practice and good analytical experience in water, fuel and oil analysis. A knowledge of metallurgy or chemical engineering will be an advantage.

The appointment will be subject to the provisions of the Authority's Superannuation Scheme.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, Yorkshire Division, British Electricity House, St. Mary's Road, Leeds 7, to whom completed forms should be returned within 14 days from the appearance of this advertisement. Envelopes to be endorsed " Station Chemist—Neepsend."

G. A. VOWLES,
Divisional Controller.
(D 508)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following appointment in the Technical Department at the Meter Testing Station, 95-103 Park Street, Southwark, London S.E.1:

SECOND ASSISTANT ENGINEER

He will be required to take complete charge of the Meter Testing Station. Salary within the range £707 8s. to £838 13s. per annum, plus 5 per cent. per annum, London Area allowance. This salary is provisional and subject to negotiation with the appropriate organisation. The appointment will be superannuable under the terms of the British Electricity Authority's Superannuation Scheme.

Applicants should have a degree or Higher National Certificate or equivalent, and should preferably have had experience in the manufacture and testing of impulse summation metering, instruments, relays, and kindred apparatus.

The successful applicant will be responsible for the commissioning and maintenance of power station metering and electrical instruments, the conduct of electrical measurements on turbine efficiency tests, and h.v. testing up to 150 kV. Additional duties include the assessment of electrical quantities for accountancy and operational purposes.

Applications for the foregoing vacancy, stating age, qualifications, and experience, should be addressed to the Acting Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, London S.W.1, and be received within 14 days of the appearance of this advertisement.

J. N. WAITE,
Divisional Controller.
(D 540)

SOUTH WESTERN ELECTRICITY BOARD

APPOINTMENT OF DEMONSTRATORS

APPLICATIONS are invited for positions as Demonstrators within the Board's area as follows:—

(a) Se ior Demonstrator, Taunton. (Commencing salary between £350 to 450 per annum).

(b) Demonstrators in various towns in Somerset, De on, and Cornwall. (Commencing salaries between £300 to £350 per annum.)

Applicants should have had sound training in domestic science and possession of the E.A.W. certificate will be an advantage.

The duties will include demonstration of electrical appliances in service centres, consumers' homes, and at public gatherings.

Commencing salaries, which will be in accordance with qualifications and experience, will be provisional, pending the adoption of nationally negotiated scales.

Applications, giving details of age, experience, and qualifications, and stating whether for (a) or (b), and preference of locality (if any), should reach the Assistant Secretary (Establishments), South Western Electricity Board, Electricity House, Colston Avenue, Bristol 1, within seven days. (D 548)

BRITISH ELECTRICITY AUTHORITY

Merseyside and North Wales Division

APPLICATIONS are invited for the appointment of JUNIOR SWITCHBOARD ATTENDANT for shift duties at the Percival Lane Power Station, Runcorn.

Applicants must have had experience in the operation of h.t. and l.t. switchgear in a modern generating station.

The salary will be in accordance with the National Joint Board Schedule, the appointment being at present in Class "J," Grade 10a, i.e. £367 per annum, rising to £383 per annum.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, Merseyside and North Wales Division, British Electricity House, Clarke Gardens, Wootton, Liverpool, and should be returned to him in a sealed envelope endorsed in the top left-hand corner "Junior Switchboard Attendant," so as to be received not later than Friday, February 17, 1950. (D 528)

BRITISH ELECTRICITY AUTHORITY

North Western Division

APPLICATIONS are invited for the position of :

(a) CHARGE ENGINEER at Wigan Generating Station. Salary in accordance with Class "G," Grade 8, of the N.J.B. Schedule, i.e. £505-£515 per annum.

Candidates should preferably hold the Higher National Certificate or its equivalent in Mechanical or Electrical Engineering.

(b) CONTROL ROOM ATTENDANT at Fadiham Generating Station.

Salary in accordance with Class "G," Grade 9a, of the N.J.B. Schedule, i.e. £375-£391 per annum.

Experience in Control Room duties, and the possession of technical qualifications will be an advantage.

Applications, stating age, and full details of qualifications and experience, should be received by the Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than seven days after the appearance of this advertisement. (D 536)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the following appointments in the South Wales Division :—

(a) ASSISTANT COMBUSTION AND EFFICIENCY ENGINEER, at Upper Boat Power Station, at a salary in accordance with the National Joint Board Schedule, Class "K," Grade 8b (£526-£551 per annum).

(b) GENERAL ASSISTANT ENGINEER on the Divisional Transmission Staff to be centred in the Neath Section at a commencing salary of £342 8s. per annum.

The above salaries are provisional and subject to negotiation through the appropriate national machinery.

Applicants for both posts should hold the Higher National Certificate or its equivalent, and have had a recognised works training. Those applying for (a) should have had some experience in the Combustion Department of a modern generating station, whereas for (b) experience in the maintenance and or erection of High Voltage Sub-station equipment or overhead lines will be an advantage.

The appointments will be superannuable under the British Electricity Authority and Area Board's scheme.

Forms of application may be obtained from the Divisional Secretary at the address below to whom completed applications should be returned not later than February 18, 1950, in a sealed envelope endorsed with the appointment sought.

H. V. PUGH,
Divisional Controller.

Cardiff (Pengam Moors) Airport,
Cardiff.
January 25, 1950. (D 525)

SOUTH WESTERN ELECTRICITY BOARD

APPLICATIONS are invited for the position of ASSISTANT DISTRICT COMMERCIAL OFFICER, West Devon district, with headquarters at Bideford, in the Torquay and West Devon Sub-Area. The salary, which is provisional pending the adoption of nationally negotiated scales, will be £525 p.a.

Candidates should be experienced in rural development work. They should also have a sound knowledge of I.E.E. and Factory Regulations, and of the selection, sale, installation and maintenance of electrical appliances, and be capable of advising consumers on tariffs and costs.

Graduate or corporate membership of the I.E.E. would be an advantage.

Detailed applications to be submitted to Assistant Secretary (Establishments), South Western Electricity Board, Electricity House, Colston Avenue, Bristol 1, within ten days. (D 545)

SOUTHERN ELECTRICITY BOARD

No. 3 (Portsmouth) Sub-Area

APPLICATIONS are invited for the appointment of ASSISTANT BRANCH ENGINEER in the Portsmouth District of the No. 3 (Portsmouth) Sub-Area. The provisional commencing salary will be £461 per annum on Class "J," Grade 9 of the N.J.B. Schedule, subject to adjustment by the appropriate negotiating machinery, with N.J.B. Conditions of Service. The successful applicant will, subject to certain conditions, be required to contribute to the staff superannuation scheme, membership of which is compulsory.

Applicants should have a good technical education, training, and experience in general mains work, including the laying and jointing of h.v. and l.v. cables, preparation of plans and estimates in connection with mains extensions, location of faults, and mains testing. Applicants should be graduate members of the I.E.E. or hold qualifications admitting to that class of membership.

Applications, on forms to be obtained from the Sub-Area Secretary, should be submitted to him at Lower Drayton Lane, Cosham, Portsmouth, in envelopes endorsed "Assistant Branch Engineer, Portsmouth," within 14 days from the publication of this advertisement. (D 552)

GOVERNMENT OF IRAQ

CHIEF MECHANICAL AND ELECTRICAL ENGINEER required by the Directorate-General of Municipalities, Iraq, for a tour of 2½ years in first instance. Salary of not less than I.D. 170 a month, plus cost-of-living allowance of between I.D. 10 and I.D. 14 a month according to dependants. (I.D. 1 equals £1.) The post is non-pensionable but there is a Provident Fund. Free passages. Candidates must be Corporate Members of the Institution of Mechanical Engineers and the Institution of Electrical Engineers, or possess one of these qualifications, and have a sound technical knowledge and suitable experience in both electrical and mechanical engineering. They must be capable of undertaking the design of a.c. and d.c. public lighting systems and be fully acquainted with the installation, maintenance and operation of diesel electric generating plants and electrically driven pumping units, and the layout and construction of h.t. and l.t. overhead lines.

Apply, at once, by letter, stating age, whether married or single, and full particulars of qualifications and experience and mentioning this paper to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting M/N 24754 3B on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (D 509)

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

POWER STATION SUPERINTENDENT
BARUGH POWER STATION

APPLICATIONS are invited for the above appointment. The duties will also involve the supervision of the Barnsley Power Station.

Salary will be in accordance with the N.J.B. Schedule, Grade 3, Class "F," at present £687-£715 per annum.

Applicants must be corporate members of one of the senior engineering institutions, and have had a wide experience in the operation, maintenance and administration of a power station.

Conditions of service will be in accordance with the N.J.B. Agreement. The appointment will be subject to superannuation under terms and conditions approved by the British Electricity Authority.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, Yorkshire Division, British Electricity House, St. Mary's Road, Leeds 7, to whom completed forms should be returned not later than 14 days from the appearance of this advertisement, envelopes to be endorsed "Power Station Superintendent, Barugh."

G. A. VOWLES,
Divisional Controller.
(D 550)

LONDON ELECTRICITY BOARD

VACANCIES—JUNIOR ENGINEERS

APPLICATIONS are invited for vacancies as Junior Engineers in the Western Sub-Area. The successful candidates will be employed initially in the Testing Department based at Fulham, but must be prepared to work anywhere in the Sub-Area.

Applicants should have had a sound technical education to the minimum standard of the Higher National Certificate for Electrical Engineering. They should have completed an engineering apprenticeship with a manufacturing firm or an equivalent course of training, and should have had sound practical experience in one or more of the following: h.v. and l.v. mains, h.v. and l.v. switchgear, transformer chamber and sub-station erection, and general testing work.

The commencing salary will be from £450 per annum, dependent on qualifications and experience. This salary is provisional and subject to adjustment through the appropriate negotiating machinery.

Application forms on receipt of an addressed foolscap envelope, from Establishments Officer, 46/47 New Broad Street, E.C.2, to be returned not later than February 15, 1950. Please mark envelope EST/V.627/T. (D 541)

UNIVERSITY OF NOTTINGHAM

Department of Electrical Engineering

APPLICATIONS are invited for the appointment of ASSISTANT LECTURER in Electrical Engineering. Preference will be given to candidates with an Honours Degree and works or research experience. Salary scale £450 by £25 to £500.

Conditions of appointment and form of application may be obtained from the Registrar, University of Nottingham. (D 515)

BRITISH ELECTRICITY AUTHORITY

South West Scotland Division

STAFF VACANCY NOTICE

APPLICATIONS are invited for the position of ASSISTANT POWER STATION SUPERINTENDENT at Dalmarnock Generating Station. The salary will be within the range of £735-£831 per annum, this being on Class "L," Grade 5 of the National Joint Board Schedule. This rate is provisional until a final scale has been agreed with the appropriate organisation.

The successful applicant will be responsible to the Station Superintendent for the efficient operation and maintenance of the station and in the absence of the Superintendent will be required to assume full responsibility for all matters in connection therewith. Experience with high-pressure stoker-fired boilers is essential.

Applicants should hold the minimum qualification of the Higher National Certificate in Engineering and membership of one of the senior engineering institutions will be advantageous.

The appointment will be subject to superannuation under the terms and conditions approved by the British Electricity Authority.

Applications, stating age, qualifications, and experience, should be forwarded on the appropriate form to the Divisional Secretary, British Electricity House, 168 Broomhill Drive, Glasgow W.1, which may be obtained from him.

The closing date for applications is February 20, 1950.

E. J. EDGAR,
Divisional Controller.

January 28, 1950. (D 539)

ASSISTANT required for electrical wholesalers' trade counter. Good wages. Profit-sharing scheme in operation.—Apply, Gibbs and Dandy, Ltd., 94 George Street, Luton. (D 500)

BOILER HOUSE MANAGER required by a large and modern industrial company in Southern England. Applicants should possess a thorough knowledge of, and experience in, the operation and maintenance of high pressure automatic stoker fired water tube boilers and their auxiliaries. Experience desirable in water treatment. An attractive commencing salary will be offered. To the right man, this is a permanent, progressive and pensionable appointment. Replies will be treated in strict confidence.—Please send brief particulars of age, experience, etc., to: Box No. 1799, Electrical Times. (D 522)

CHIEF DRAUGHTSMAN required to control office for transformers up to 5,000 kVA.—Apply, giving age, experience, and salary required to Box No. 1791, Electrical Times. (D 499)

DESIGNER DRAUGHTSMAN. Opportunity arises for a junior in connection with the development of small electro-mechanisms, preferably with some experience.—Applications, giving details of salary, age, training and experience in confidence, to Box No. 1787, Electrical Times. *This advertisement is published by permission of the Ministry of Labour and National Service.* (D 490)

DRAUGHTSMAN (young) required, to assist generally in sales office engaged in development of electrical (switchgear) and mechanical interlock schemes.—Apply by letter, stating age, experience, and salary required to: J. H. Castell, 81 Gower Street, London W.C.1. (D 556)

ELECTRICAL ENGINEERS are required by the Nelson Research Laboratories, Stafford. Applicants should possess a degree in electrical engineering and have experience in the operation and maintenance of heavy electrical plant. Duties will include short circuit testing of switchgear, and applicants must have an interest in development work. Successful married applicants with a family will be considered for a house after probationary period.—Write, giving full details, quoting reference 299, to Central Personnel Services, English Electric Co., Ltd., 24 Gillingham Street, London S.W.1. (D 489)

ELECTRICAL INSPECTORS required by major oil company operating in Middle East. Applicants should have a wide experience of inspection and testing of motors, switchgear, and the electrical equipment associated with modern large generating stations, substations, and transmission and distribution networks with voltage range of 33 kV to 440 V. Knowledge of flameproof equipment an advantage. Possession of Higher National Certificate essential and qualifications up to A.M.I.E.E. desirable. Age limit 37 years. Attractive salary, plus generous allowance in local currency, free passages out and home, free medical attention, kit allowance, pension scheme, good leave arrangements.—Write, stating age and full details of qualifications and experience, quoting Dept. F.182, to Box 2333 at 191 Gresham House, E.C.2. (C 304)

ELECTRICIAN WIREMAN required; experienced all systems.—Apply, in writing, Giffords, Basingstoke. (D 496)

ENGINEER required for electricity supply undertaking in Bagdad. Applications are invited from Engineers age 30-40 with a sound technical training who have a wide practical experience in the operation, maintenance and administration of a modern steam power station of at least 15,000 kW. Plant erection and mains distribution experience would be an advantage.

Salary £120 per month, plus high cost of living allowance (at present £22 10s. per month), plus free house with heavy furniture or monthly house allowance of £12.

Three year contract, renewable, with first-class passage each way for successful applicant and family (if married). Three months' leave on full pay in U.K. on completion of 24 consecutive months in Iraq, first-class leave passages being paid.—Box No. 1797, Electrical Times. (D 519)

EXPERIENCED REPRESENTATIVE in London and the Home Counties required by fuse and switchgear manufacturer offering complete ranges of domestic and industrial fusegear, now including circuit breakers and h.r.c. cartridges. Wholesalers' connection essential, but applicants experienced in cable and similar lines would be considered. Excellent opportunity for keen young man.—G. P. Dennis, Ltd., Fleming Road, Speke, Liverpool 19. (D 466)

EXPERIENCED RUBBER CABLE SALESMAN required for South Wales. Applications should be sent with details of training, qualifications, age and experience, to the Employment and Welfare Manager, Johnson and Phillips Ltd., Victoria Works, Charlton, London S.E.7. (D 504)

FERRANTI LTD. invite applications from well-qualified ENGINEERS with experience in the design, or operation, of special purpose metering equipment. The successful applicant is required to assist in formulating design policy and to take charge of a development section engaged in this type of work. He will also be required to give technical advice to customers and plan metering schemes to meet individual requirements. The position is one of great interest and carries prospects of promotion. Salary will be in the range of £900 to £1,300 per annum.

Application forms from the Staff Manager, Ferranti Ltd., Hollinwood, Lancs. (D 364)

FIRST-CLASS ENGINEERING AGENTS required to take charge of new construction projects at site. Applicants should have had experience on large power station construction or similar projects. Preference will be given to candidates with appropriate professional qualifications. Commencing salaries from £750 per annum, according to experience. Pension and other staff schemes in operation. Applications, stating age and giving full particulars of training and experience, to be addressed to The Secretary, Ewbank and Partners Ltd., 15 Grosvenor Place, London S.W.1. (D 497)

FOREMAN wanted for maintenance and installation of Electrical Plant in heavy engineering works in S.E. London. Knowledge generation, distribution, lighting and electronics essential. Suitable for ex-ship's engineer. Please give details. Box No. 1795, Electrical Times. (D 514)

JUNIOR DRAUGHTSMAN required for detail and assembly drawing, modifications and schedule preparation for manufacturers of electro-mechanical devices in West London area.—Write full details of experience and salary required to Box No. 1731, Electrical Times. (D 382)

LABORATORY ASSISTANT with experience in connection with meters, time switches and allied subjects. Higher National Certificate or Grad. I.E.E. Standard. Salary in accordance with experience and qualifications.—Write, giving full details to: Box No. 1803, Electrical Times. (D 532)

LIGHTING DESIGN ENGINEER to prepare fluorescent and other lighting schemes in London office of electrical manufacturers. Nat. Cert. E.E. Lighting training and experience necessary. I.E.S. member preferred. British National about 30.—Please give full information to: Box No. 1793, Electrical Times. (D 506)

METHODS ENGINEER required with practical knowledge of modern assembly methods on mass and batch production by manufacturers of small electro-mechanical devices. Experience in motion study essential. Age 35-45. West London area.—Full particulars and salary required to Box No. 1733, Electrical Times. (D 383)

PAPER CABLE ESTIMATOR, preferably with experience of foreign specifications required.—Full particulars to Aberdare Cables, Ltd., Aberdare, Glamorgan. (D 438)

PLANNING ENGINEER with experience of electrical precision engineering required by manufacturers of time switches and meters. Write, giving full particulars of experience and qualifications. Salary in accordance with ability.—Box No. 1805, Electrical Times. (D 533)

REPRESENTATIVE (experienced) required for north-east area of England by the manufacturers of "Britmac" electrical accessories, to call upon wholesalers contractors, large works, etc. Applicants must have a sound connection with the electrical trade. Successful applicant will be required to join firm's pension scheme.—Reply fully, stating age, experience, salary required, and supply at least two references, Britmac Electrical Co., Ltd., Wharfdale Road, Tyseley, Birmingham 11. (D 470)

REQUIRED immediately capable ESTIMATOR for paper cable manufacturing company in the home Counties. Good salary and prospects. Excellent canteen available. Applications treated in the strictest confidence.—Box No. 1593, Electrical Times. (C 786)

REQUIRED, FOREMAN TRANSFORMER WINDER to take charge of Male and Female Transformer Winders covering range of 200 kVA down to radio size. Must be specialist. Top rates paid. Excellent opportunities for right man.—Box No. 1779, Electrical Times. (D 477)

REVO ELECTRIC CO. LTD. require additional SALES REPRESENTATIVES in the following areas : Yorkshire and East Midlands.

Applicants should be 30/35 years of age, have good electrical background with knowledge of modern street lighting technique and domestic appliances, should be residents in these areas and possession of a car would be an advantage. Only men of proved ability considered.

Applications should be made, giving full details of experience, salary required, etc., in confidence to Sales Director, Britannia Works, Tipton, Staffs. (D 511)

REVO ELECTRIC CO. LTD., require first-class SALES REPRESENTATIVES for Scotland.

Applicants should be 30/35 years of age, have good electrical background with experience of electric cookers and domestic appliances, should be resident in this area and possession of a car would be an advantage. Only men of proved ability considered.

Application should be made, giving full details of experience, salary required, etc., in confidence to Sales Director, Britannia Works, Tipton, Staffs. (D 512)

TECHNICAL REPRESENTATIVE for N.W. London area. Own car and outstanding personality essential. £450 p.a. expenses and commission. Must be experienced and hard-working. To apply in writing, to British Central Elec. Co. Ltd., 6/8 Rosebery Avenue, E.C.1, sending full details of career and testimonials. (D 510)

TRANSFORMER CHARGE-HAND required, fully conversant with layout and manufacture of Neon transformers. State previous experience and salary required. Brilliant Neons Ltd., Paragon Works, Uxbridge Road, Shepherds Bush, W.12. (D 516)

J. W. WOOLLEY & CO. LTD.

A REPRESENTATIVE, preferably having contacts with farmers and to some extent with agricultural implement dealers, is wanted by J. W. Woolley and Co., Ltd., of Tamworth for each of the following Board Areas:—

(1) Eastern (especially Eastern Counties).
(2) North West (especially Lancashire).
(3) Mersey and N. Wales (especially Cheshire).
(4) South Eastern.

Only those with first-class credentials who have an enthusiasm for work of this sort and who are capable of taking on increased responsibility later need apply.

All replies, which will be treated in confidence, to be sent to J. W. Woolley, Parkfield House, Two Gates, Tamworth, Staffs. Testimonials or other supporting documents should not be sent in the first instance, but the applicant should include details of education, all positions held since leaving school, the extent of his knowledge of:

(a) Woolley Sterilising Equipment, and
(b) Alfa-Laval, Fullwood, Gascoigne and Simplex Milking Equipment,

and the remuneration required.

Envelopes to be marked "Personal 1", 2, 3 or 4 as the case may be, in the top left hand corner. (D 538p)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

THE Brush Electrical Engineering Co., Ltd., has vacancies for experienced SWITCHGEAR DRAUGHTSMEN for design, development or contract work. Permanent position with good prospects of promotion and excellent staff conditions. Men with good drawing office experience willing to be trained in switchgear engineering will be considered.—Applications, giving details of experience and salary required, to the Technical Director, Loughborough. (D 404)

THE John Lewis Partnership invites applications from men over 30 years of age for a SENIOR APPOINTMENT which, it is hoped, will lead to a Directorship of buying radio, television and electrical appliances. Starting pay will be up to £2,000 a year. Experience in merchandising these goods is an essential qualification. Applications should be sent to reach the Director of Personnel, John Lewis and Co., Ltd., Oxford Street, W.1, by February 18, and should contain full particulars of past experience and present rate of pay. Invitations for preliminary interview will reach candidates by March 1, and final results of applications will be sent in every case by March 15. (D 505)

TRANSFORMER COREPLATE FOREMAN OR CHARGE HAND required by large manufacturers in the London area. Must be experienced in core cutting, punching and building and capable of controlling the department. This is a Staff appointment with a superannuation scheme in operation.—Apply, in writing, stating age, experience, names of previous employers and salary required to: Box No. 1801, Electrical Times. (D 529)

WANTED for small works producing fractional h.p. and d.c. motors, rotary transformers, etc., CAPABLE DESIGNER able to carry through the design from development stage right up to production. Applicant would also be considered to act as assistant to manager. Good prospects. Age, 30/35.

Applications, in writing, stating age, experience and salary required, to: Personnel Department, George Kent Ltd., Luton, Beds. (D 534)

APPOINTMENTS WANTED

BREAKDOWN ELECTRICIAN seeks situation: 16 years' experience fault location and repair of all types electrical plant, drive; travel anywhere. Resident North London.—Box No. 1757, Electrical Times. (D 432)

ELECTRICAL INSPECTOR (42), recently returned from Asia, seeks situation either in U.K. or overseas. Wide experience of construction and maintenance with various types of installations, both industrial and domestic.—Box No. 1789, Electrical Times. (D 495)

ELECTRONICS CONSULTANT seeks post anywhere in South America.—Box No. 1811, Electrical Times. (D 551)

ENGLISHMAN just returned from Colonies, 44, married, seeks new post in U.K. Experienced administration and sales, backed by wide technical knowledge of lighting, electronics, household equipment, etc.—Box No. 1721, Electrical Times. (D 371)

KEEN London Graduate, 23, all-round manufacturing, and power station experience, wants progressive, good position or agency in Indian branch of a British firm or in Indian firm.—Box No. 1771, Electrical Times. (D 455)

REPRESENTATIVE, with own car, desires Agency for accessories, cables, fittings, switchgear, etc. Commission basis. 25 years' personal connection with Factors in Lancs. and Cheshire. Valuable contacts Elec. Boards. —Box No. 1813, Electrical Times. (D 555)

WORK WANTED

A.C. and d.c. ELECTRIC MOTOR REWINDS AND REPAIRS. Prompt service, fully guaranteed. Phone: EDGware 8631 (4 lines).—Service Electric Co., Ltd., Stanmore, Middx. (D 324)

ARMATURE ROTOR AND STATOR WINDING. We specialise in the repair and rewind of all types of electrical machines from fractional h.p. upwards. Special departments for vacuum cleaners, dryers, portable tools, etc. All work fully guaranteed.—Walter Crane, Greencoat Electrical Works, Westgate, Wakefield. Telephone 2172. (A 4)

CASTINGS, Fisher Foundries, Ltd., Greet, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (D 206)

COIL WINDING and SMALL TRANSFORMERS, to any specification. Coils and transformers rewound—Avon Transformer Co., 20 Heath Terrace, Leamington Spa (C774)

SMALL progressive firm desires contract work, ARMATURE AND STATOR WINDING, ASSEMBLY, TURNING considered. Competitive prices; high-class workmanship guaranteed.—Box No. 1729, Electrical Times. (D 379)

ZEROS REFRIGERATORS.—Complete range of repair and service now available. Equipment reconditioned to conform to pre-war manufacturers' specifications.—Time Engineers, Refrigeration Specialists, 60 Southend Road, Rainham, Essex. Tel.: Rainham 2358: or Southern Area Agency. Tel.: Springpark 4217. Electrical Spares supplied to the trade. (A 639)

WANTED

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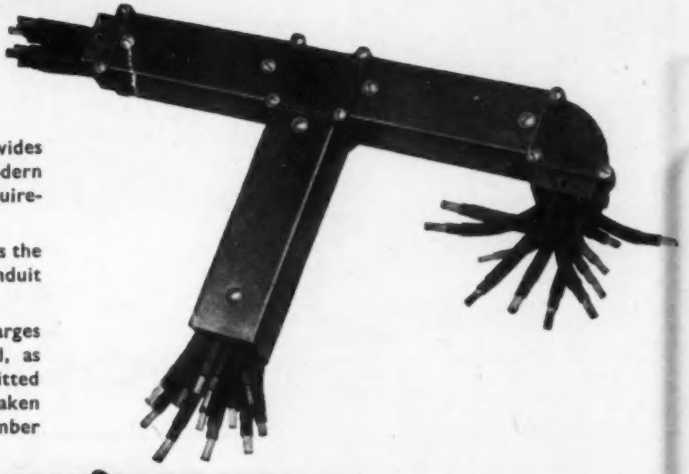

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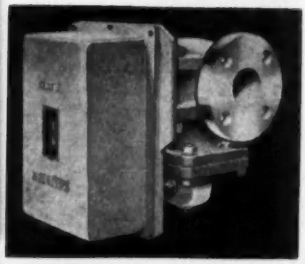

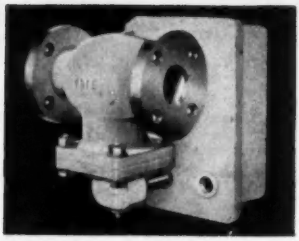

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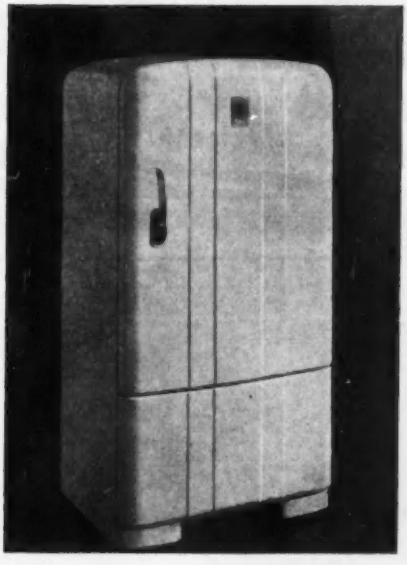

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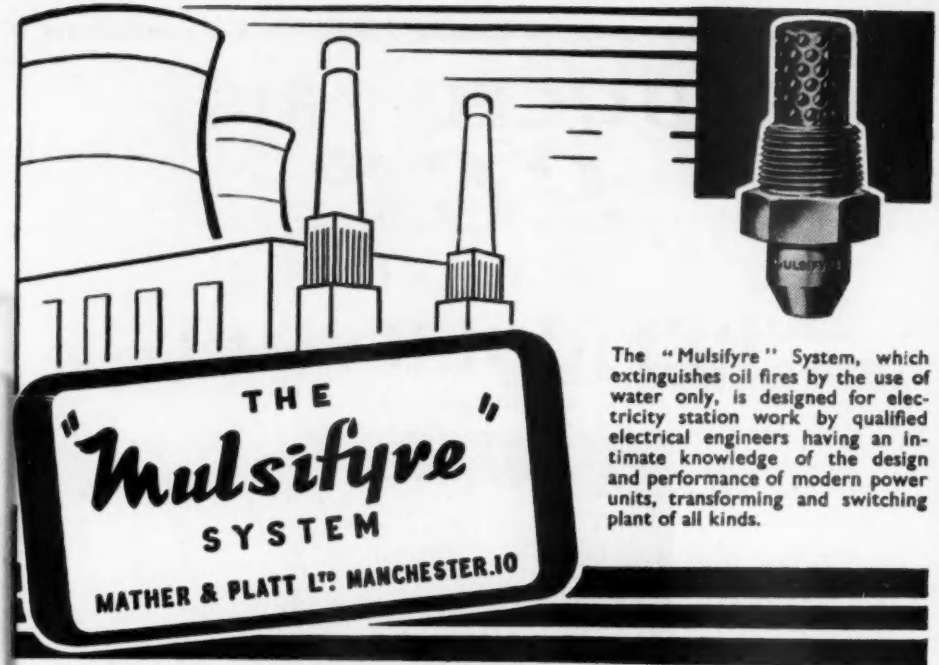

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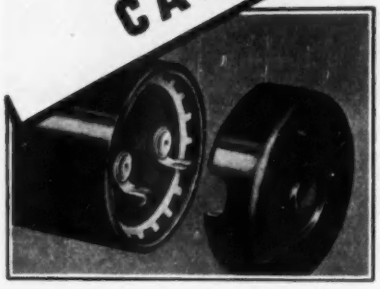

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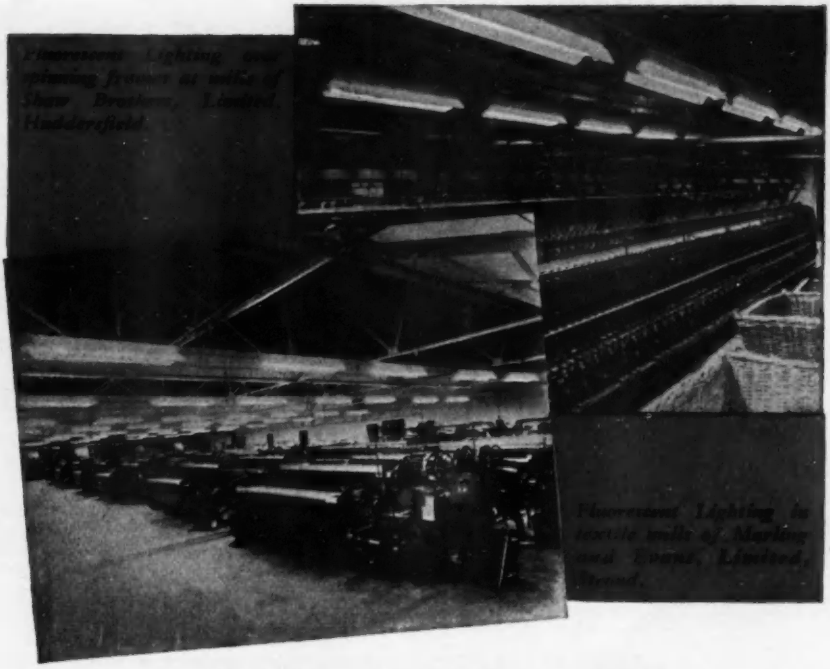

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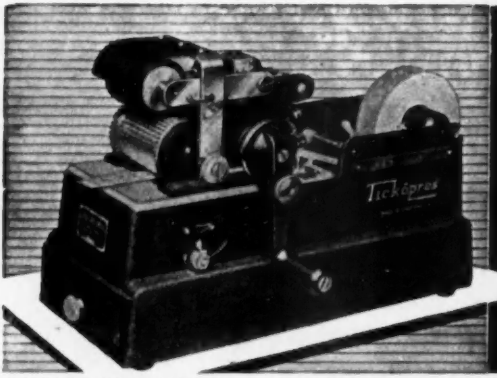

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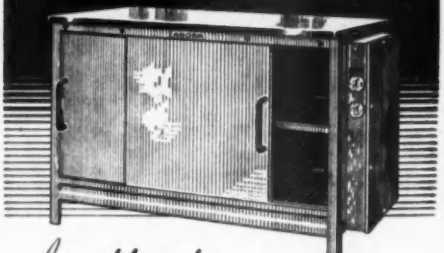

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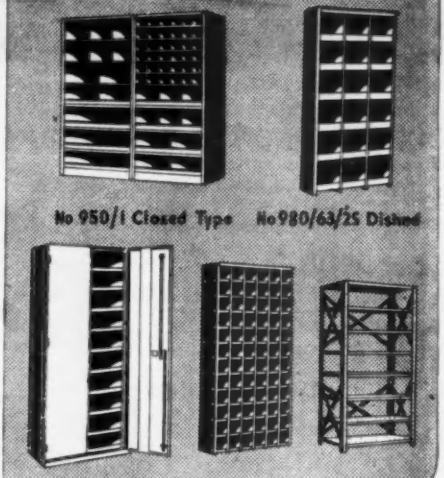

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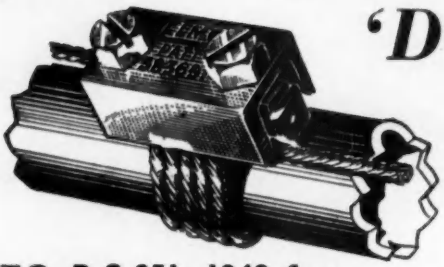

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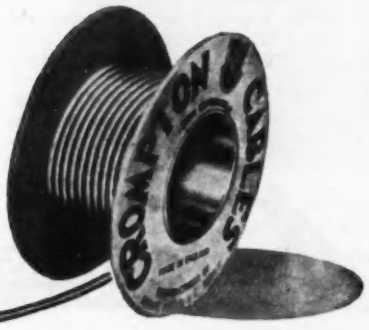

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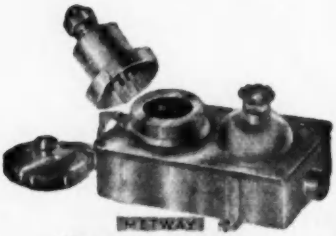

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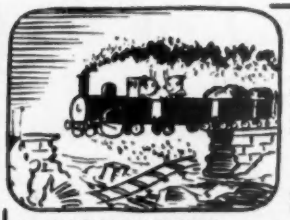

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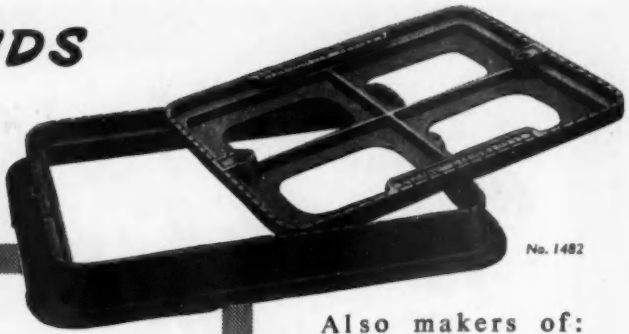

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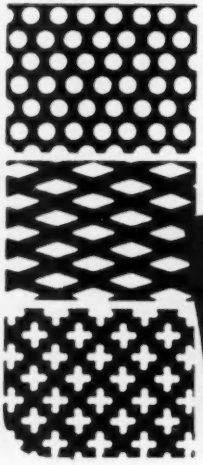

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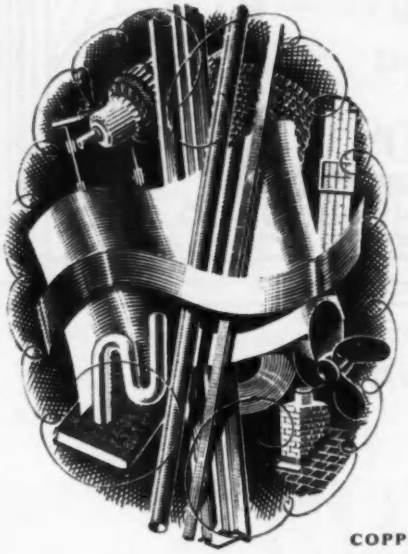

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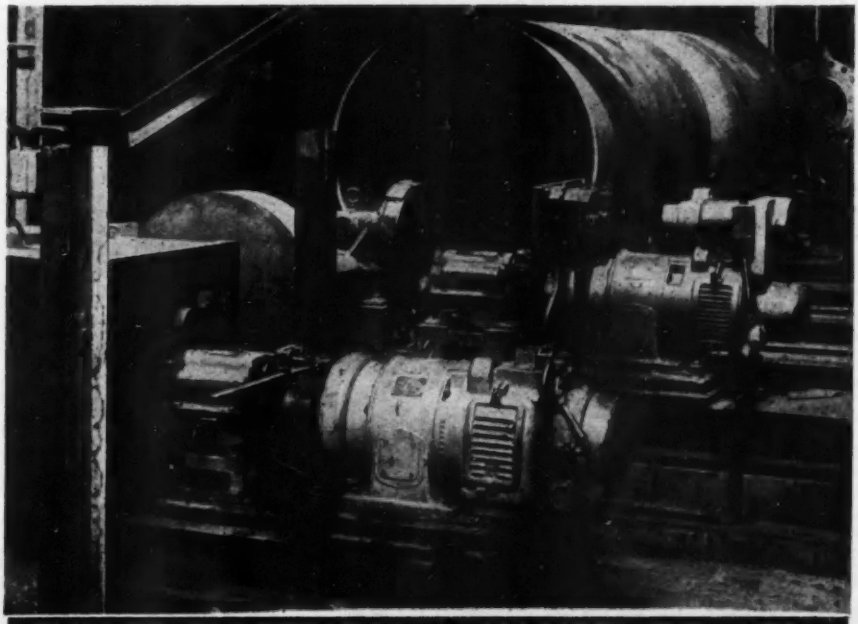

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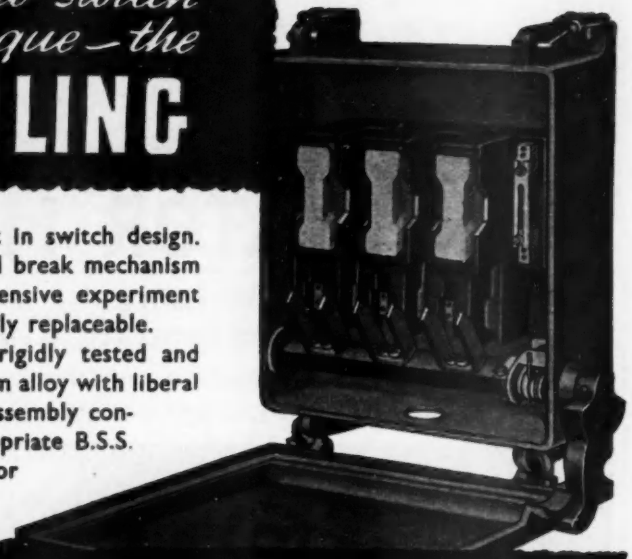

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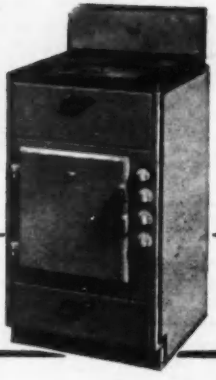

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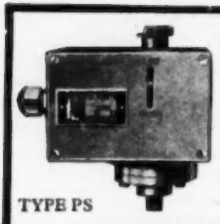

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Washers Plates Commutator Segments Stampings Stove Plates Heater Strips, etc.	Mouldings, Commutator Vee Rings, Tubes, Covered Bars, Commutator Segments, Heater Strips. Sheet Material in Moulding, Flexible, Heat Resisting and Commutator Qualities, etc.	Tubes Bushes, Bobbins Washers Stampings Panels Covered Bars, etc.

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THE MODERN
FRACTIONAL H.P. MOTOR

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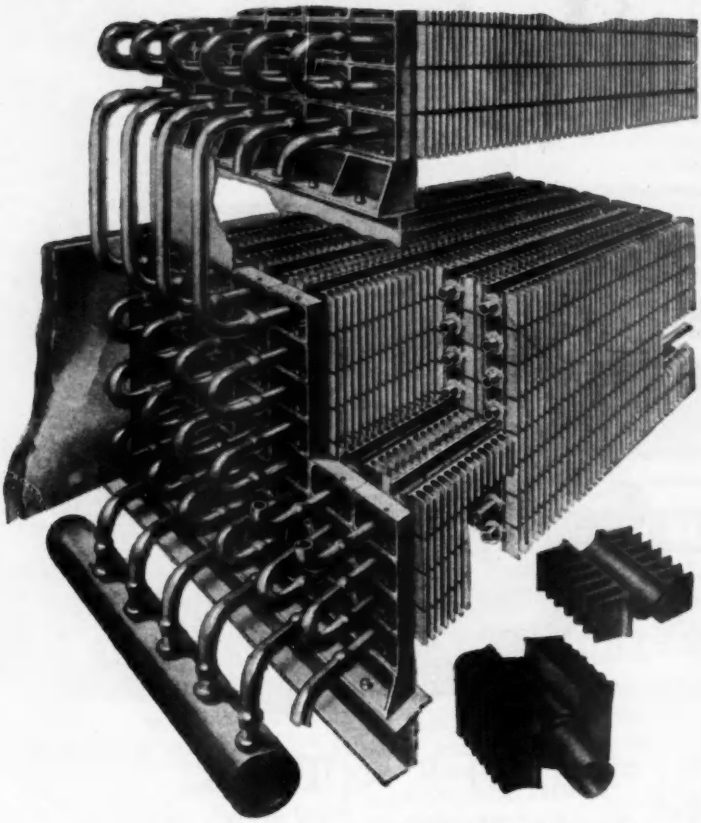
Associated Companies:—Foster Transformers & Switchgear Ltd. · Crypto Ltd. · Crypton Equipment Ltd.

SENIOR ECONOMISERS

WELDED TYPE FOR CENTRAL POWER STATIONS



Showing construction of Tube Elements

The all-welded Senior Economiser was developed to meet the conditions o extra high working pressures up to and above 2,000 lb. per sq. in. Such installations have been in operation since 1938, with complete satisfaction. The advantages of the all-welded type are now being appreciated for much lower pressures.

The tube elements consist of cold-drawn seamless steel tubes, on to which are shrunk cast-iron sleeves with the characteristic Senior H-type gills.

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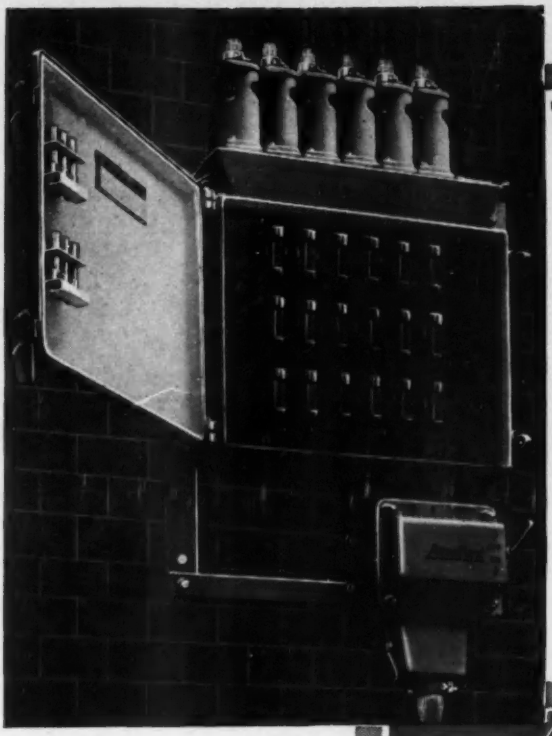
Ironclad
DISTRIBUTION FUSEBOARDS



These Multiway Fuse Boards are constructed of cast iron and are entirely suitable for arduous conditions of service ; they incorporate removable troughs or steel top and bottom plates thereby facilitating drilling and cabling.

The extensive range comprises both watertight and dust excluding Distribution Fuse Boards covering large and small capacities, each incorporating Aeroflex High-breaking capacity rewireable cartridge fuses.

List Section No. 28B fully describes these distribution boards.

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